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Family Economics and Nutrition Review

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Expenditures on Children by Families

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U.S. Department of Agriculture
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Since 1960 the U.S. Department of Agriculture has provided annual estimates of expenditures on children from their birth through age 17. This article presents the 2001 estimates for husband-wife and single-parent families. Data and methods used in calculating annual child-rearing expenses are described. Estimates are provided by budgetary component, age of the child, family income, and region of residence. For the overall United States, estimates of child-rearing expenses ranged between \$9,030 and \$10,140 for a child in a two-child, married-couple family in the middle-income group.

Child rearing is a costly endeavor. Since 1960 the U.S. Department of Agriculture (USDA) has provided annual estimates of family expenditures on children from their birth through age 17. USDA's annual child-rearing expense estimates are used in four major ways:

- **To determine State child support guidelines.** Under the Family Support Act of 1988, States are required to have numeric child support guidelines and to consider the economic costs of raising a child in these guidelines. The economic well-being of millions of children is affected by child support.
- **To determine State foster care payments.** In 1999 about 581,000 children were in foster care (U.S. Department of Health and Human Services, 2001).
- **To appraise damages arising from personal injury or wrongful death cases.** For example, if a person with children is hurt on a job such that he or she cannot work, the courts use the expense figures to determine compensation for the family.

- **To educate anyone considering when or whether to have children.** These expense estimates also may encourage teens to wait until they are adults and more prepared financially to have children.

This article presents the 2001 expenditure estimates associated with rearing children. Data and methods used in calculating the child-rearing expenses are described; then, the estimated expenses are discussed.

USDA Method for Estimating Expenditures on Children by Families¹

USDA provides annual estimates of expenditures on children, by husband-wife and single-parent families, from their birth through age 17. Expenditures on children are estimated for the

¹*Expenditures on Children by Families: 2001 Annual Report* provides a more detailed description of the data and methods. To obtain a copy go to <http://www.cnpp.usda.gov>, or contact USDA, Center for Nutrition Policy and Promotion, 3101 Park Center Drive, Room 1034, Alexandria, VA 22302 (telephone: 703-305-7600).

major budgetary components: housing, food, transportation, clothing, health care, child care/education, and miscellaneous goods and services (see box below).

The most recently calculated child-rearing expenses are based on 1990-92 Consumer Expenditure Survey (CE) data, which are updated to 2001 dollars by using the Consumer Price Index (CPI). The CE, administered by the Bureau of Labor Statistics, U.S. Department of Labor, is the only Federal survey of household expenditures collected nationwide. It contains information on sociodemographic characteristics, income, and expenditures of a nationally representative sample of households. The sample consisted of 12,850 husband-wife and 3,395 single-parent households, weighted to reflect the U.S. population of interest.

In determining child-rearing expenses, USDA examines the intrahousehold distribution of expenditures by using data for each budgetary component. The CE contains child-specific expenditure data for some budgetary components (clothing, child care, and education) and household-level data for the other budgetary components (housing, food, transportation, health care, and miscellaneous goods and services). Multivariate analysis was used to estimate household and child-specific expenditures, controlling for income level, family size, age of the child, and region of residence (when appropriate) so expenses could be determined for families with these varying characteristics. Estimates of child-rearing expenses are provided for three income levels of husband-wife families. These income groups were determined by dividing the sample for the overall United States into equal thirds.

For each income level, the estimates are for the younger child in families with two children. These younger children were grouped in one of six age categories: 0-2, 3-5, 6-8, 9-11, 12-14, or 15-17. Households with two children were selected as the standard because this was the average household size in 1990-92. The focus is on the younger child because the older child may be over age 17.

USDA's estimates are based on CE interviews of households with and without specific expenses. For some families, expenditures may be higher or lower than the mean estimates, depending on whether or not they incur the expense. Child care and education are examples, since about 50 percent of husband-wife families in the study spent no money on these services. Also, the estimates cover only out-of-pocket expenditures on children made by the parents and not by others, such as grandparents or friends.

Categories of Household Expenditures

Housing expenses: shelter (mortgage interest, property taxes, or rent; maintenance and repairs; and insurance), utilities (gas, electricity, fuel, telephone, and water), and house furnishings and equipment (furniture, floor coverings, and major and small appliances). For homeowners, housing expenses do not include mortgage principal payments; in the data set used, such payments are considered to be part of savings.

Food expenses: food and nonalcoholic beverages purchased at grocery, convenience, and specialty stores, including purchases with food stamps; dining at restaurants; and household expenditures on school meals.

Transportation expenses: the net outlay on the purchase of new and used vehicles, vehicle finance charges, gasoline and motor oil, maintenance and repairs, insurance, and public transportation.

Clothing expenses: children's apparel such as diapers, shirts, pants, dresses, and suits; footwear; and clothing services such as dry cleaning, alterations and repair, and storage.

Health care expenses: medical and dental services not covered by insurance, prescription drugs and medical supplies not covered by insurance, and health insurance premiums not paid by the employer or other organizations.

Child care and education expenses: daycare tuition and supplies; babysitting; and elementary and high school tuition, books, and supplies.

Miscellaneous expenses: personal care items, entertainment, and reading materials.

After estimating the various overall household and child-specific expenditures, USDA allocated these total amounts among family members (i.e., in a married-couple, two-child family, the total amounts were allocated to the husband, wife, older child, and younger child). Because the expenditures for clothing, child care, and education are child-specific and thus apply only to children, allocations of these expenses were made by dividing them equally among the children. The CE does not collect expenditures on food and health care. Thus, to apportion these budgetary components to a child by his or her age, USDA used data from other Federal studies that show the shares of the household budget spent on children's food and health care.

Unlike food and health care, no authoritative source exists for allocating among family members the amount the household spends on housing, transportation, and other miscellaneous goods and services. Two common approaches used to allocate these expenses are the marginal cost method and the per capita method.

The marginal cost method measures expenditures on children as the difference in expenses between couples with children and equivalent childless couples. Various equivalency measures have been proposed, yielding very different estimates of expenditures on children, with no standard measure accepted by economists. Also, the marginal cost approach assumes that the difference in total expenditures between couples with and without children can be attributed solely to the presence of children in a family. This assumption is questionable, especially because couples without children often buy homes larger than they need in anticipation of having children. Comparing the expenditures of these couples to those of similar couples with children could lead to underestimating

how much is spent on meeting the lifetime needs—and wants—of children.

For these reasons, USDA uses the per capita method to allocate expenses on housing, transportation, and miscellaneous goods and services among household members in equal proportions. Although the per capita method has its limitations, these limitations are considered less severe than those of the marginal cost approach. Because transportation expenses resulting from work activities are not directly related to the cost of raising a child, these expenses were excluded when determining children's transportation expenses.

Estimated expenses on children increased as income level rose (fig. 1).

Expenditures on Children by Husband-Wife Families

Child-Rearing Expenses and Household Income Are Positively Associated

Estimated expenses on children increased as income level rose (fig. 1). Depending on the age of the child, the annual expenses ranged from \$6,490 to \$7,560 for families in the lowest income group, from \$9,030 to \$10,140 for families in the middle-income group, and from \$13,410 to \$14,670 for families in the highest income group. The before-tax income in 2001 for the lowest income group was less than \$39,100, between \$39,100 and \$65,800 for the middle-income group, and more than \$65,800 for the highest income group.

On average, households in the lowest income group spent 28 percent of their before-tax income per year on a child; those in the middle-income group, 18 percent; and those in the highest group, 14 percent. The range in these percentages would be narrower if after-tax income were considered, because a

greater percentage of income in higher income households goes toward taxes.

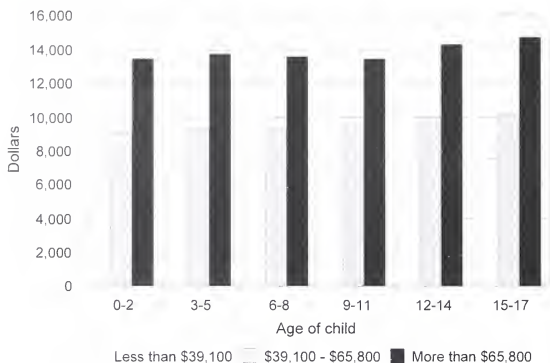
On average, the amount spent on children by families in the highest income group was slightly less than twice the amount spent by families in the lowest income group. This amount varied by budgetary component. In general, expenses on a child for goods and services considered to be necessities (e.g., food and clothing) did not vary as much as those considered to be discretionary (e.g., miscellaneous expenses) among households in the three income groups.

Housing Is the Largest Expense on a Child

Housing accounted for the largest share of total child-rearing expenses; figure 2 demonstrates this for middle-income families. Based on an average expense incurred among the six age groups, housing accounted for 33 percent of child-rearing expenses for a child in the lowest income group, 35 percent in the middle-income group, and 38 percent in the highest income group. Food, the second largest average expense on a child for families regardless of income level, accounted for 20 percent of child-rearing expenses in the lowest income group, 17 percent in the middle-income group, and 15 percent in the highest income group. Transportation was the third largest child-rearing expense across income levels, 13 to 14 percent.

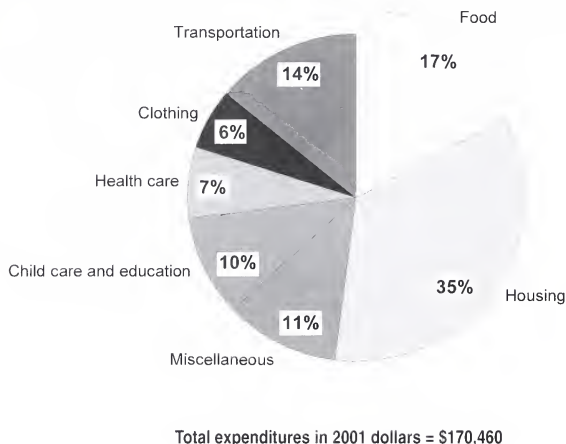
Across the three income groups, miscellaneous goods and services (personal care items, entertainment, and reading materials) was the fourth largest expense on a child for families, 10 to 12 percent. Clothing (excluding gifts or hand-me-downs) accounted for 5 to 7 percent of expenses on a child for families; child care and education, 8 to 11 percent; and health care, 6 to 8 percent. Estimated expenditures for health care included only out-of-

Figure 1. 2001 family expenditures on a child, by income level and age of child¹



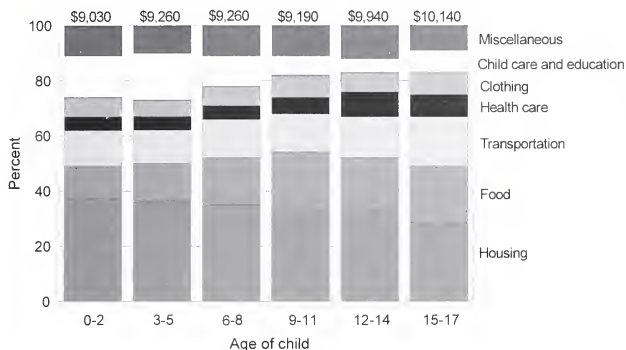
¹U.S. average for the younger child in husband-wife families with two children.

Figure 2. 2001 family expenditure shares on a child from birth through age 17¹



¹U.S. average for the younger child in middle-income, husband-wife families with two children.

Figure 3. 2001 family expenditure shares on a child, by age of child¹



Expenditures on a child were generally lower in the younger age categories and higher in the older age categories.

¹U.S. average for the younger child in middle-income, husband-wife families with two children.

pocket expenses (including insurance premiums not paid by an employer or other organizations) and not that portion covered by health insurance.

Expenses Increase as a Child Ages

Expenditures on a child were generally lower in the younger age categories and higher in the older age categories. Figure 3 depicts this for families in the middle-income group. This relationship held across income groups even though housing expenses, the highest child-rearing expenditure, generally declined as a child grew older. The decline in housing expenses reflects diminishing interest paid by homeowners over the life of a mortgage. Payments on principal are not considered part of housing costs in the CE; they are deemed to be a part of savings.

For all three income groups, food, transportation, clothing, and health care expenses related to child-rearing generally increased as the child grew older. Transportation expenses were

highest for a child age 15-17, when he or she would start driving. Child care and education expenses were highest for a child under age 6. Most of this expense may be attributed to child care at this age. The estimated expense for child care and education may seem low for those with the expenses: these estimates reflect the average of households with and without the expense.

Child-Rearing Expenses Are Highest in the Urban West

Child-rearing expenses in the regions of the country reflect patterns observed in the overall United States; in each region, expenses on a child increased with household income level and, generally, with the age of the child. Overall, child-rearing expenses were highest in the urban West, followed by the urban Northeast and urban South. Figure 4 shows total child-rearing expenses by region and age of a child for middle-income families. Child-rearing expenses were lowest in the urban Midwest and rural areas. Much

of the difference in expenses on a child among regions was related to housing costs. Total housing expenses on a child were highest in the urban West and urban Northeast and lowest in rural areas. However, child-rearing transportation expenses were highest for families in rural areas. This likely reflects the longer traveling distances and the lack of public transportation in these areas.

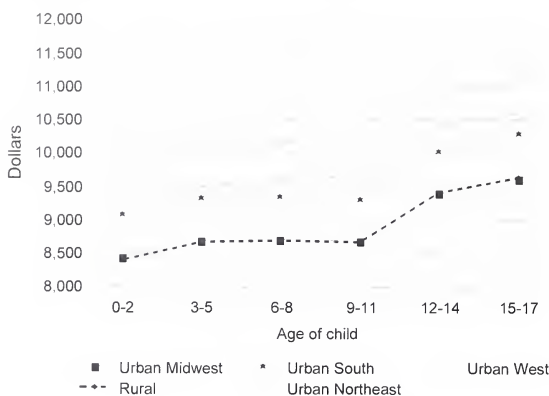
Children Are “Cheaper by the Dozen”

The expense estimates on a child represent expenditures on the younger child at various ages in a husband-wife household with two children. It cannot be assumed that expenses on the older child are the same at these various ages. The method for estimating expenses on the younger child was essentially repeated to determine whether expenses vary by birth order. The focus was on the older child in each of the same age categories as those used with the younger child. A two-child family was again used as the standard.

On average, for husband-wife households with two children, expenditures did not vary by birth order. Thus, annual expenditures on children in a husband-wife, two-child family may be estimated by summing the expenses for the two appropriate age categories reported in figure 1.

Although expenses on children did not vary by birth order, they did differ when a household had only one child or more than two children. Depending on the number of other children in the household, families spent more or less on a child—achieving a “cheaper-by-the-dozen” effect as they have more children. That is, the cost of two children is less than double the cost of one child.

Figure 4. 2001 family expenditures on a child, by region and age of child¹



¹Regional averages for the younger child in middle-income, husband-wife families with two children.

The method to estimate child-rearing expenses was repeated for families with one child and families with three or more children. Compared with expenditures for each child in a husband-wife family with two children, husband-wife households with one child spent an average of 24 percent more on the single child; those with three or more children spent an average of 23 percent less on each child. Hence, family income is spread over fewer or more children, subject to economies of scale. As families have more children, the children can share a bedroom, clothing and toys can be handed down to younger children, and food can be purchased in larger and more economical packages.

Expenditures on Children by Single-Parent Families

The estimates of expenditures on children by husband-wife families do

not apply to single-parent families, a group that accounts for an increasing percentage of families with children. Therefore, separate estimates were made of child-rearing expenses in single-parent households for the overall United States. CE data were used to do so. Most single-parent families in the survey were headed by a woman (90 percent). The method previously described was followed; regional estimates were not calculated for single-parent families because of limitations in the sample size.

Estimates cover only out-of-pocket child-rearing expenditures made by the single parent with primary care of the child and do not include child-related expenditures made by the parent without primary care or made by others, such as grandparents. The data did not contain this information. Overall expenses by both parents on a child in a single-parent household are likely greater than the USDA child-rearing expense estimates.

Table 1. 2001 family expenditures on a child, by lower income single-parent and husband-wife households¹

Age of child	Single-parent households	Husband-wife households
0 - 2	\$5,440	\$6,490
3 - 5	6,150	6,630
6 - 8	6,910	6,710
9 - 11	6,440	6,730
12 - 14	6,920	7,560
15 - 17	7,670	7,480
Total (0 - 17)	\$118,590	\$124,800

¹Estimates are for the younger child in two-child families in the overall United States.

Table 1 presents estimated expenditures on the younger child in a single-parent family with two children, compared with those of the younger child in a husband-wife family with two children. Each family type was in the lower income group, having before-tax income less than \$39,100. About 83 percent of single-parent families and 33 percent of husband-wife families were in this lower income group. More single-parent than husband-wife families, however, were in the bottom range of this income group, and had an average income of \$16,400, compared with \$24,400 for husband-wife families. Although average income varied for these families, total expenditures on a child through age 17 were, on average, only 5 percent lower in single-parent households than in two-parent households.

Single-parent families in this lower income group, therefore, spent a larger proportion of their income on children than did their counterpart two-parent families. On average, housing expenses were higher for single-parent families than for two-parent families, whereas transportation, health care, child care and education, and miscellaneous expenditures on a child were lower

in single-parent than in husband-wife households. Child-related food and clothing expenditures were similar, on average, for both family types.

For the higher income group of single-parent families with 2001 before-tax income of \$39,100 and over,² estimates of child-rearing expenses were about the same as those for two-parent households in the before-tax income group of \$65,800 and over. In 2001 dollars, total expenses for the younger child through age 17 were \$250,260 for single-parent families versus \$249,180 for husband-wife families. Child-rearing expenses for the higher income group of single-parent families, therefore, were also a larger proportion of income than was the case for husband-wife families. Thus, expenditures on children do not differ much between single-parent and husband-wife households; what differs is household income levels. Because single-parent families have one less potential earner than do husband-wife families, on average, their total household income is lower, and child-rearing expenses are a greater percentage of income.

²The two higher income groups were combined for single-parent families.

The same procedure was used to estimate child-rearing expenses on an older child in single-parent households as well as by household size. On average, single-parent households with two children spent 7 percent less on the older child than on the younger child (in addition to age-related differences). This contrasts with husband-wife households whose expenditures on children were unaffected by the children's birth order.

As with husband-wife households, single-parent households spent more or less if there was either one child or there were three or more children. Compared with expenditures for the younger child in a single-parent household with two children, expenditures for an only child in a single-parent household averaged 35 percent more; households with three or more children averaged 28 percent less on each child.

Other Expenditures on Children

The USDA child-rearing expense estimates consist of direct expenses made by parents on children through age 17 for seven major budgetary components. The expenses exclude costs related to childbirth and prenatal health care and other expenditures, especially those incurred after a child turns age 18.

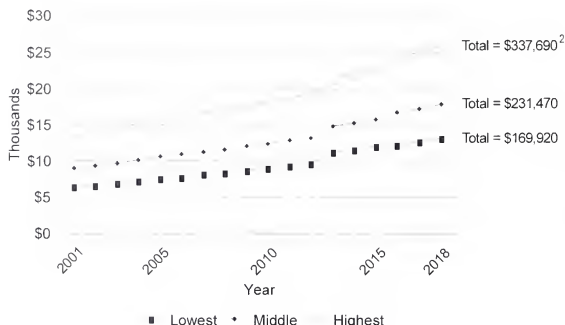
One of the largest expenses made on children after age 17 is the cost of a college education. The College Board estimated that in 2001-2002, annual average tuition and fees were \$3,586 at 4-year public colleges and \$14,456 at 4-year private colleges; annual room and board was \$4,956 at 4-year public colleges and \$5,704 at 4-year private colleges (The College Board, 2001). Other parental expenses on children

Child-Rearing Expenses Over Time

The estimates presented in this article represent household expenditures on a child of a certain age in 2001. Future price changes need to be incorporated to estimate these expenses over time. Thus, a future cost formula was used, and the results are presented in the graph below.

The estimated future expenditures are on the younger child in a husband-wife family with two children. The assumptions are that a child is born in 2001 and reaches age 17 in 2018 and that the average annual inflation rate over this time is 3.4 percent (the average annual inflation rate over the past 20 years). The result: total family expenses on a child through age 17 would be \$169,920 for households in the lowest income group, \$231,470 for those in the middle, and \$337,690 for those in the highest income group.

Estimated annual expenditures on a child born in 2001, by income group, overall United States¹



¹Estimates are for the younger child in husband-wife families with two children.

²Total reflects expenses on a child through age 7.

after age 17 could include those associated with children living at home or, if children do not live at home, gifts and other contributions to them. A 1996 survey found that 47 percent of parents in their fifties support children over age 21 (Phoenix Home Life Mutual Insurance Company, 1996).

USDA's estimates do not include all government expenditures on children, such as public education, Medicaid, and subsidized school meals. Actual expenditures on children (by parents and the government), therefore, would be higher than reported here. The indirect costs of raising children—time allocated to child rearing and decreased earnings—are not included in the estimates. Although these costs are more difficult to measure than direct expenditures, they can be just as high, if not higher, than the direct costs of raising children (Spalter-Roth & Hartmann, 1990; Bryant, Zick, & Kim, 1992; Ireland & Ward, 1995).

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Consumers' Retail Source of Food: A Cluster Analysis

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The popular impression that only half of our food comes from retail grocery stores is based on food expenditure data. However, the U.S. Department of Agriculture's Continuing Survey of Food Intakes by Individuals, 1994 shows that 72 percent of the amount of food (measured in grams) consumed by Americans comes from grocery stores. Using cluster analysis, we grouped consumers based on where they obtained their food and found that half were "Home Cookers"—purchasing 93 percent of their food from grocery stores. By comparison, the "High Service" consumers, which represented 10 percent of the sample, purchased 43 percent of their food from restaurants. This research quantifies the different shopping behaviors exhibited by groups of people in the United States and discusses some of the demographic differences among the clusters. The results are of interest to consumers, nutrition counselors, food retailers, and policymakers who deal with retail food, low-income diets, or food safety.

In economic analysis of consumer behavior, substituting expenditure for quantity is a common practice. For example, expenditure is often substituted for quantity when estimating the percentage change in the amount consumed when income changes by 1 percent (Engel function). This substitution is often used because expenditure data rather than quantity are more frequently available. And from a business perspective, expenditures are more closely related to sales—the indicator (or metric) most used by businesses to measure demand for their products. Tracking consumers' food consumption behavior with expenditure data is no exception: the percentage of income spent on food is a common measure of economic well-being both for individual households and for nations.

The percentage of personal disposable income spent on food by American consumers decreased from 25 to 11

percent between 1960 and 1997 (Putnam & Allshouse, 1996). The composition of those expenditures changed noticeably, with a decreasing proportion of each food dollar being spent on food from a retail food store called "food at home." Food-away-from-home expenditures, according to the food service and restaurant sector, grew from 26 to 45 percent of each food dollar between 1960 and 1994; by the end of 1995, the amount reached 47 percent (Putnam & Allshouse, 1996). In recent years, expenditures on food away from home have approached 50 percent (Putnam & Allshouse, 1996).

The rapid rise in food-away-from-home expenditures is reflected in another metric: the high growth in sales at commercial food service establishments relative to the growth in sales in retail food stores. Between 1987 and 1999, inflation-adjusted sales in eating and drinking establishments grew an average of 2.2 percent; similar sales in

retail food stores, however, decreased an average 0.1 percent (Food Institute, 1997).

Focusing on the proportion of the food dollar that is spent in places other than a grocery store leads to the common belief that Americans eat almost half of their food away from home. The *amounts of food* consumers eat at home or away from home, however, varies considerably from the expenditure proportions reported in the literature. Expenditures in food service establishments reflect higher costs of labor (about 30 percent of the menu price), entertainment, and service.

In contrast, we reported in 1998 that when food consumption is measured in grams, the amount of food purchased from retail stores is 72 percent of all food consumed (Carlson, Kinsey, & Nadav, 1998). Another 14 percent of food (in grams) was consumed from carryout establishments (e.g., fast-food, pizza, and sandwich shops) and other restaurants combined. The remaining 14 percent came from other sources—other people and gifts, cafeterias, vending machines, coffee or food on a common tray in an office, bars and taverns, home gardens or hunting and fishing, and public programs. When food consumption is measured by expenditure, the amount of food (g) consumed away from home is 47 percent, almost twice as much as that consumed from restaurants, carryouts, and other establishments.

Our earlier research also found that where people purchase their food did not necessarily predict where they consumed their food. For example, 10 percent of food purchased in stores was not consumed at home, while 24 percent of carryout food was consumed at home (Carlson, Kinsey, & Nadav, 1998). Rising household incomes and fewer hours for household labor foretell a rising value of time and, in turn,

predict that consumers will purchase more labor services in their pursuit of food (Kinsey, 1983). Even within a grocery store, sales of ready-to-eat foods—including those that must be heated—are rising while sales for basic ingredients are falling.

Studies in the 1970's and 1980's found that higher incomes led consumers to spend more money on meals eaten out but did not necessarily lead consumers to eat more meals away from home (Prochaska & Shrimper, 1973). A similar conclusion from other research suggests that households with wives who work part-time increased their expenditures on food away from home more so than did households where wives worked full-time even though both households had the same income (Kinsey, 1983).

As women's time in the labor market expands from zero to part-time, increases in income may expand the opportunity to eat out. But as employment becomes full-time, less time is available to eat out or cook at home. Thus, continued increases in income are not further associated with increased expenditures on food away from home. In fact, increases in income may even decrease expenditures on food away from home as consumers substitute fast-foods or take-out foods for more leisurely dining away from home (Kinsey, 1983). These findings suggest that the traditional labels of "food at home" and "food away from home," as well as the use of expenditure as the metric for quantity, do not provide a complete understanding of today's consumer.

The research reported here investigates the amount of food (g) that consumers reported eating in 1994 from various retail sources and examines the common characteristics of consumers whose retail sources of food vary from the average. We used data from the USDA

Continuing Survey of Food Intakes by Individuals, 1994 (CSFII) (USDA, 1994). We examined two questions: (1) What are the unique characteristics of people who shop for food in different types of establishments? (2) How can this information be used by managers of these establishments and public policymakers? To answer these questions, we used cluster analysis to group consumers by the retail source of their food and to describe their common shopping and eating habits.

Data and Methods

The CSFII is conducted by the Agricultural Research Service (USDA, 1994).¹ We used data from 1994 because they were the most recent data available when this study began. The CSFII data provide a better picture of overall consumption behavior than do data collected at the market level where sales are the unit of measure. The CSFII reports all food eaten by 5,589 individuals in 2,540 households in the United States. Each individual reports food intake for 2 nonconsecutive days, yielding more than 150,000 observations on individual food items. For every food item, the respondent also lists the source from which the food was obtained and how much was eaten. The sources of food used in this analysis include stores, carryout restaurants, restaurants, other people, bars and taverns, cafeterias, common coffee pots or trays, vending machines, mail order, public programs, and home-grown or caught food (see box). The response rate for the CSFII is 80 percent for the first day and 76 percent for the second day. Sample weights are used in this analysis, and the results are generalizable to the population.

¹These data are available from the U.S. Department of Commerce, Technology Administration, National Technical Service, 5285 Port Royal Road, Springfield, VA 22161, (703) 487-4650, <http://www.ntis.gov>.

Analysis

The first step in our analysis was to calculate the percentage of food, measured in grams, each person consumed from each source. Cluster analysis is used to place the adult sample² into groups based on where they obtained their food. In this case, the cluster variables are the percentage of food (g) adults consumed that come from various sources. For example, if one person's diet contains 80 percent of food from stores, 5 percent from carryout restaurants, 10 percent from restaurants, and the remaining 5 percent from cafeterias, cluster analysis uses these percentages to place that person into a group with others who have similar consumption patterns.

This analysis uses the "k-means" method of clustering that is used by SAS FASTCLUS. This method is one of the better techniques available for clustering large data sets where the goal is to divide respondents into manageable and meaningful groups to describe behavior (Hartigan, 1985; SAS Institute, 1989). K-means selects the centers of the initial clusters from the first observations in the data set and then assigns the other observations to the *nearest* cluster. When an observation is added to the cluster, k-means recalculates the mean of the cluster variables, and this mean becomes the new cluster-center. If this recalculated cluster-center changes another cluster that is closest to an observation already in the cluster, then k-means moves that observation to the closest cluster and recalculates the center of its new cluster. The process continues until the number of changes is very small.

Categories of Food Sources

Store: supermarket, grocery store, warehouse, convenience store, drug store, gas station, bakery, deli, seafood shop, ethnic food store, health food store, commissary, produce stand, and farmers' market.

Carryout: traditional hamburger, chicken, and carryout pizza restaurants; and other restaurants where customers order, pick up, and pay for food at a counter.

Restaurants: any other establishment where the food is served at the table by restaurant staff.

Other People: food received as a gift or while a guest in someone's home.

Bars and Taverns: a location the respondent classified as a bar or tavern rather than as a restaurant, carryout restaurant, or cafeteria.

School and Non-School Cafeterias: Most non-school cafeterias are based in offices. For most of the analysis, school and non-school cafeterias are separated but are often put together in summary tables.

Common Coffee Pot or Food Tray: office coffee pots, food platters at a reception or in an office, and potluck dinners.

Vending Machines: food purchased from vending machines located within stores, restaurants, cafeterias, offices, or other locations.

Mail Order: food received from a mail order catalog or club that sends food out regularly, such as a fruit-of-the-month club.

Public Programs: a combination of several CSFII categories including child and adult care centers, day care centers in private homes, soup kitchens, shelters, food pantries, Meals on Wheels, other community food programs, and residential care facilities.

Home-Grown or Caught: food that is grown or gathered by the respondent or someone the respondent knows; meat and fish procured by hunting or fishing.

²Because children's eating behaviors are somewhat dictated by their parents, children are not included in the cluster analysis.

Representing 75 percent of the adult sample, six of the nine clusters get more food from stores than any other source . . .

The resulting clusters are based on 2 nonconsecutive days of dietary recall. Thus, if an individual had been sampled on a different day, he or she might have ended up in a different cluster. However, because this data set is designed to be nationally representative, similar clusters would form on any day, except major national holidays.

To reduce the bias towards observations that appear at the beginning of the data set, we used a technique recommended by SAS (SAS Institute, 1989). In the first pass, the SAS procedure forms 50 clusters and saves the cluster centers in a file. Over half of these clusters have fewer than five observations, and the centers are ignored. The remaining 24 centers form the “seeds” in the next iteration to form 24 new clusters. In the third iteration, the center of the smallest cluster is removed, and the SAS procedure forms 23 new clusters from all observations. This process continues until there are five clusters. The process is described in more detail elsewhere (Carlson, Kinsey, & Nadav, 1998; MacQueen, 1967).

The second step compared each cluster with the rest of the sample to address the two research questions. Because most of the data were categorical, this study used three nonparametric tests: the chi-squared, the Kolmogorov-Smirnov test, and the Kruskal-Wallis test (described in detail elsewhere) (Siegel, 1956). These tests measure differences in distributions of variables among different subgroups. The chi-squared test was used as an initial test for differences. Differences between the observed versus expected distributions were confirmed by the other two tests. The Kolmogorov-Smirnov test was used to measure differences between two clusters in the distribution of categorical variables that cannot be ranked (e.g., race) and the Kruskal-Wallis test for differences in categories that can be

ranked (e.g., age, income, and education). For these tests, we divided the continuous variables into categories. For example, the categories for age were 19-30, 31-40, 40-50, 50-60, 60-64, and 65+; for education, less than high school, high school degree or GED, some college, 4-year degree, and professional or graduate study.

Results and Discussion

Nineteen clusters formed around the various sources of food. Several sources, such as carryout, had more than one cluster form around it. This paper will discuss only nine of these clusters, some with names based on the unique characteristics of the cluster: Working Family, Young Professional, Manager, and City Office. In other cases, the names are based on where the people in the cluster shopped: Home Cookers, Carryout, High Service, Office, and Students and Faculty.

Sociodemographic Characteristics of the Sample

Almost half (49 percent) of the adult sample was in the Home Cookers cluster (table 1), followed by those in the Working Family cluster (11 percent), and High Service cluster (10 percent). Fewer adults were in the other clusters: Carryout, Office, Manager, Young Professional, City Office, and Students and Faculty (from 3 percent to a low of 0.6 percent).

Age, Race, and Gender. With an average age of 51, people in the Home Cookers cluster were significantly older than the rest of the adult sample (tables 1 and 2). However, the standard deviation for their age was the largest (17.9, not shown), indicating a bigger spread in age than was the case for the other clusters. Three clusters—Students and Faculty, Carryout, and Young Professional—had the youngest members (mean age of 37, 36, and 31,

Table 1. Statistically significant demographic characteristics of select clusters of consumers based on where they purchased food

Cluster	Percent of adults ¹	Age, race, and gender	Income and education	Occupation and employment	Region, urban, and household size
Home Cookers	49	Older**	Lower income** Less college**	Fewer professional/technical, and manager/proprietor** More not employed**	
Working Family	11	Younger**	More "some college**"	More full- and part-time**	Larger households**
Carryout	3	Younger than Working Family** Fewer White*		More full- and part-time*	More Northeast**
Young Professional	0.7	Younger than Carryout**	Higher income** More college and graduate study**	More full-time**	
High Service	10	More White** More men*	Higher income** More college**	More professional/technical, and manager/proprietor* More full-time**	
Office	2.5			More full-time**	
Manager	2.0		Higher income** More college/university**	More professional/technical, and manager/proprietor* More full-time**	More central city*
City Office	1.0			More full-time**	More central city*
Students and Faculty	0.6	More Asian/Pacific and "other"*** Fewer females*	More college and graduate**	More full- and part-time*	More Northeast**

¹Percents do not add to 100, because all clusters are not shown in the table.

* p<.05; ** p<.01: The distribution between the cluster and the rest of the adult sample is significantly different based on the Kruskal-Wallis test.

respectively). Whereas significantly more Whites were in the High Service cluster, fewer Whites were in the Carryout cluster, and more Asian/Pacific Islanders and others were in the Students and Faculty cluster.

The High Service cluster had significantly fewer women (46 percent).³

³Differences are in the distributions between the cluster and the total adult sample. The p-values do not indicate how these distributions differ, only that they are different.

compared with the remainder of the adult sample. The Young Professional cluster also had relatively few women (35 percent), but the difference from the adult sample was not significant. The Young Professional cluster, however, represented only 0.7 percent of the total sample; thus, the small size of this cluster may have contributed to the lack of statistical significance.

Income, Education, and Employment.

Mean income among the clusters ranged from \$32,554 to \$49,072. Compared with the rest of the sample, the Home Cookers cluster had a significantly lower income; three clusters had a higher income: High Service (\$42,767), Young Professional (\$48,507), and Manager (\$49,072). Although people in the Working Family and Carryout clusters earned a household income close to the Home Cookers' income (\$36,466 and

Table 2. Basic sociodemographic characteristics of select clusters of consumers based on where they purchased food

Cluster	Adult sample	Women	Center city resident	High school degree or more	Employed	Household size	Age	Income
	Percent				Mean			
Entire Adult Sample	100	49.8	33.3	76.6	57.5	2.9	48.3	\$35,298
Home Cookers	49.0	51.4	33.4	71.0	46.5	2.9	51.4	32,554
Working Family	10.0	47.8	31.4	82.7	65.7	3.2	41.8	36,466
Carryout	11.0	45.2	40.9	82.6	78.3	3.2	36.0	34,555
Young Professional	3.0	34.8	30.4	91.3	95.7	3.4	30.8	48,507
High Service	0.7	45.5	35.1	85.6	62.1	2.8	48.3	42,767
Office	2.4	55.7	39.2	76.0	73.4	3.0	49.0	39,824
Manager ¹	2.0	45.6	45.6	82.5	77.2	2.7	46.8	49,072
City Office	0.7	52.2	52.2	82.6	91.3	2.8	41.5	35,963
Students and Faculty	1.0	68.8	21.9	90.6	87.5	3.2	36.8	44,361

¹Includes a high concentration of professionals, technical workers, managers, and proprietors.

\$34,555, respectively), the distribution of incomes in the Working Family and Carryout clusters did not differ significantly from the rest of the sample.

Educational patterns tended to follow income patterns. Whereas the Home Cookers cluster had a significantly lower educational level, compared with the total sample, several other clusters had higher levels of education: Young Professional, Students and Faculty, High Service, Manager, and Working Family. The Young Professional and Students and Faculty cluster each had more people with 4-year college degrees and graduate or professional degrees. About 83 percent each of the members of the Working Family, Carryout, City Office, and Manager clusters graduated from high school or received more education. Of these, only the Manager cluster, with more members receiving college and university degrees, had a distribution that was significantly different from the sample. Although not significantly different from the rest of the sample,

76 percent of those in the Office cluster had a high school degree or more.

Occupation and Employment. The Home Cookers cluster, compared with the High Service and Manager clusters, had significantly fewer people in professional/technical occupations or who worked as managers/proprietors. Compared with other clusters, the Home Cookers cluster was significantly more likely to have unemployed members—and a concentration of unemployed people (including retirees). Whereas only 47 percent of the people in the Home Cookers cluster were employed, most of the people in the Young Professional cluster were employed (96 percent). A little more than three-fourths of those in the Manager cluster were employed (77 percent).

Region, Urbanization, and Household Size. Two clusters, Carryout as well as Students and Faculty, were more likely than other clusters to reside in the Northeast. Two clusters, Manager and City Office, had a higher percentage of people living in center cities, 46 and

52 percent, respectively. Household⁴ size among all the clusters ranged from an average of 2.7 to 3.4. Only the distribution for the Working Family cluster differed significantly from the rest of the sample. The Carryout and Young Professional also appeared to have larger households (3.2 and 3.4, respectively), but the distributions were similar to the remainder of the adult sample.

Food Sources

Representing 75 percent of the adult sample, six of the nine clusters get more food from stores than any other source: Home Cookers (93 percent), Office (73 percent), Working Family (70 percent), Students and Faculty (54 percent), Manager (53 percent), and High Service (47 percent) (table 3).

When using grams of food rather than expenditure as a measure of consumer buying behavior, we found that stores

⁴This analysis did not include children, but we did examine the number of children present in the households of the adult respondents.

Table 3. The percentage share of food source for select clusters of consumers based on where they purchased food

Cluster	Food store	Restaurant	Carryout	Vending	Cafeteria ¹
Home Cookers	93.1	2.5	1.1	0.3	0.1
Working Family	69.6	3.3	22.0	0.3	0.2
Carryout	34.8	3.7	57.3	0.1	0.2
Young Professional	33.8	8.2	40.4	14.2	0.8
High Service	46.8	42.8	5.0	0.4	0.4
Office	72.6	4.2	3.8	0.7	14.7
Manager	52.7	7.3	4.3	1.0	28.1
City Office	27.9	7.0	7.3	2.6	52.8
Students and Faculty	54.2	8.3	6.8	1.1	25.0

¹Both school and non-school cafeterias are combined.

Notes: Bold numbers identify the behavior around which a cluster was formed.

Totals do not add to 100, because not all sources of food are shown.

appear to play a much more important role for most consumers. A second observation is that both carryout restaurants and cafeterias have more than one cluster purchasing foods (g) from them, indicating major differences between the customers using these point-of-purchase sources. Three clusters formed around carryout food: Working Family, Carryout, and Young Professional. There are also differences in the shopping patterns, especially in the amount of food obtained from carryout restaurants, 22 to 57 percent. In addition, the Young Professional cluster is the only cluster discussed in this paper with a relatively high use of vending machines (14 percent). Similarly, four clusters formed around cafeterias as a source of food. The Office, Manager, and City Office clusters formed around non-school cafeterias, while the Students and Faculty cluster formed around school cafeterias (breakdown not shown). Except for City Office, these clusters all get at least half of the remaining food from stores, and make use of restaurants and carryout restaurants, though in different proportions.

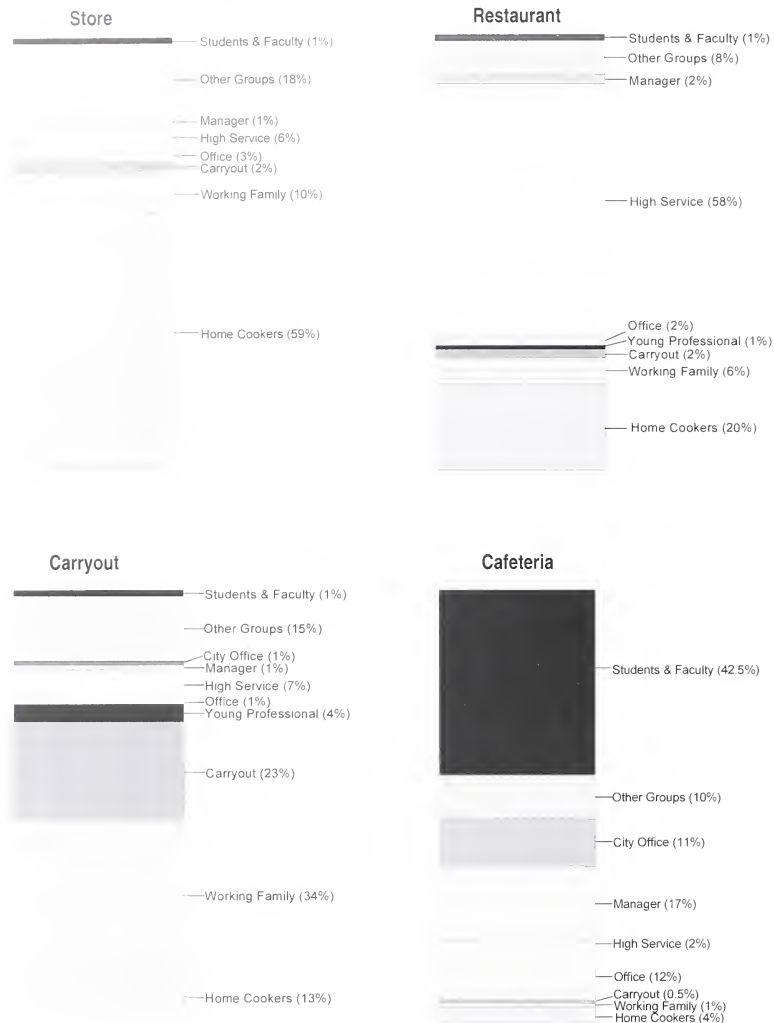
Market Profiles

When we examined consumption within markets (e.g., stores), we found that Home Cookers, the largest cluster, consumed 59 percent of all food (g) obtained from stores (fig. 1). The next two biggest clusters, Working Family and High Service, consumed 10 and 6 percent, respectively, of all food obtained from this source. This pattern of larger clusters representing larger portions of this market continued. "Other Groups" are clusters that formed but are not discussed in this paper. Each of these clusters in "Other Groups" had fewer than 100 observations; thus, statistical analysis may be misleading.

For restaurants, carryout restaurants, and cafeterias, the largest market share belonged to the cluster or clusters which formed around that source. For example, the High Service cluster, which formed around restaurants, represented 58 percent of the restaurant's market share. For carryout restaurants, the Working Family, Carryout, and Young Professional clusters consumed over three-fifths (61 percent) of all food obtained from that market. Whereas

... Home Cookers, the largest cluster, consumed 59 percent of all food (g) obtained from stores.

Figure 1. Percentage of food consumed from selected sources, by cluster



Note: "Other groups" are clusters with fewer than 100 observations; these clusters are not discussed in this paper but are needed to complete the market profile.

the High Service cluster consumed 7 percent of the food in this market, the Young Professional cluster consumed less, 4 percent. However, the High Service cluster is a much larger cluster.

For the Carryout market, 70 percent of all food obtained here was consumed by three clusters: Working Family (34 percent of the grams of food consumed), Carryout (23 percent), and Home Cookers (13 percent). As expected, the Students and Faculty, Managers, Office, and City Office clusters consumed 83 percent of the food in the school and non-school cafeteria market. No other cluster consumes a large part of their food from this source, indicating the cafeteria market is fairly focused on these four clusters.

Conclusion

Americans who report in detail what food they eat, where they eat it, and where they buy it provide us with an alternative picture of food consumption based on the quantity of food (g) consumed. This varies from the more common picture based on food expenditures and sales. While it is true that Americans obtain food from many retail and home-grown sources, 75 percent of the adult population purchased over half of their food measured in grams from retail food stores. Thus we have a very different picture from the one presented by the use of food expenditure data. This alternative picture allowed us to ask two questions, what are the unique characteristics of people who shop for food in different establishments, and how can this information be used by these establishments and by public policymakers?

An examination of the data to determine the importance of each cluster to each type of retail vendor shows that,

among the people in our sample, Home Cookers purchase 59 percent of all the grams of food that were sold in retail stores, 20 percent of restaurant food, and 13 percent of the food from carryout establishments. The clusters most likely to be consumers of carryout food were the Young Professional, Working Family, and Carryout. People in these groups tend to be younger, employed, and have some college education.

Policymakers can use this information to determine how policies will affect different market segments: stores, restaurants, cafeterias, or carryout establishments. Owners and marketers of these establishments can determine where else their customers are obtaining food and design an appropriate marketing strategy.

Future research needs to address the effect that the choice of where to obtain food has on the quality and healthfulness of the diet. Identifying the consumers who are the first to make changes to their shopping habits, as well as identifying their preferences, will help retailers and those who design public food policy to serve consumers better.

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Food, Health, and Nutrient Supplements: Beliefs Among Food Stamp-Eligible Women and Implications for Food Stamp Policy

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Several U.S. professional organizations that develop research-based dietary recommendations for the public support the position that most nutrients can and should be obtained by consuming a balanced diet. This position differs from the widespread and growing use of supplements by the public and changes in public policy currently under consideration, such as the proposal to allow nutrient supplements to be purchased with food stamps. This study investigated the attitudes and beliefs of a diverse sample of food stamp-eligible women concerning the relationship among food, health, nutrient supplementation, and associated lifestyle factors; these findings were then related to ongoing policy dialogue. The findings suggest the need to clarify the policy goals, conduct a more systematic examination of potential strategies for achieving those goals, and broaden the set of explicit criteria used when considering supplement-related policies in this population.

Many U.S. organizations that develop research-based national dietary recommendations support the position that nutrients required by healthy people can be obtained by consuming a balanced diet (Pelletier & Kendall, 1997). The American Dietetic Association maintains that "the best nutrition strategy for promoting optimal health and reducing the risk of chronic disease is to obtain adequate nutrients from a wide variety of foods" (Hunt, 1996). The Food Guide Pyramid and the *Dietary Guidelines for Americans, 2000* also support this perspective by promoting a food-based approach for U.S. consumers to achieve optimal health (Johnson & Kennedy, 2000). The use of supplements,¹ however, is a growing trend, which suggests that Americans are becoming more receptive to non-food sources of nutrition for health promotion.

A recent biannual nationwide survey conducted by the American Dietetic Association (2002), which tracks public attitudes, beliefs, knowledge, and practices related to food, nutrition, and health, found that nearly half (49 percent) of the adults surveyed took supplements daily, and more than a third (38 percent) believed that taking supplements is necessary to ensure

¹Nutrient supplements are defined by the U.S. Department of Health and Human Services (DHHS), Office of Dietary Supplements as a formulation containing at least one or more of a variety of vitamins and minerals used to supplement the diet by increasing the total dietary intake. *Dietary supplements*, a broader class of products, include a vitamin, mineral, amino acid, herb, or other botanical intended for ingestion in the form of a capsule, powder, soft gel, or gel cap, and which is not represented as a conventional food or as a sole item of a meal in the diet (Office of Dietary Supplements, 1999).

good health. The high prevalence of supplement use has been confirmed in other national surveys (Balluz, Kieszak, Philen, & Mulinare, 2000; Bender, Levy, Schucker, & Yetley, 1992; Slesniski, Subar, & Kahle, 1995; Subar & Block, 1990). Further analyses suggest that users of nutrient supplements tend to have higher incomes and education and more healthful lifestyles than do nonusers (Nayga & Reed, 1999; Neuhauser, Patterson, & Levy, 1999), although supplement use also is associated with having one or more health problems (Bender et al., 1992; Newman et al., 1998). Many studies have reported that vitamin and mineral intakes from food tend to be higher among supplement users than nonusers, but analysis of data from the 1989-91 Continuing Survey of Food Intakes by Individuals revealed that this relationship can vary across sociodemographic groups and is influenced by the motivations and beliefs for using supplements (Pelletier & Kendall, 1997).

In 1995 and 1999, Congress considered legislation to permit food stamp recipients to use their benefits to purchase dietary supplements (H.R. 104-236 and S.1307, respectively) (Thomas, 2000). This legislation was opposed by many organizations that monitor public health and hunger, including the American Academy of Pediatrics; American Heart Association; USDA; and the Food, Research, and Action Center (Pelletier & Kendall, 1997; Porter, 1995; Skolnick, 1995). These organizations voiced a range of concerns: Most important was that a policy change would depart from the original intent of the Food Stamp Program (FSP), and supplements would not provide the calories needed or full range of nutritional benefits by children to avoid health problems and maximize learning potential in school (Porter, 1995). The proposed change was also seen as an attempt by a billion-dollar

supplement industry to widen its market (Skolnick, 1995). USDA's position on this issue was stated in these terms:

Because vitamins and minerals occur naturally in foods, a good diet will include a variety of foods that together will supply all the nutrients needed. . . . Because these products serve as deficiency correctors or therapeutic agents to supplement diets deficient in essential nutrition rather than as foods, they are not eligible for purchase with food coupons. (Porter, 1995)

Those favoring the proposed legislation maintained that the bill would expand dietary choices by giving food stamp recipients the option of improving their diet through additional nutrients. The Council for Responsible Nutrition, a trade organization representing the food supplement industry, testified in Congress:

When critical food choices are necessary, spending a few cents a day for a vitamin and mineral supplement may actually be the best and most economical choice available to a person at nutrition risk. (Dickinson, 1998)

Thus, supporters framed the issue in terms of improving nutrition and maintaining personal choice.

A report prepared by USDA at the request of Congress examined issues related to this proposal (U.S. Department of Agriculture [USDA], 1999). Among other findings, the report noted vitamin and mineral intake from food differs little across income levels, food stamp recipients tend to have nutrient profiles that are comparable to non-recipients, and a third (35 percent) of food stamp recipients already purchase supplements with other income sources.

The current policy, therefore, may not restrict individual choice as some have suggested.

There is a paucity of research elucidating attitudes, beliefs, and supplement-use practices of low-income, ethnically diverse Americans. One study suggested that food stamp recipients are less likely to take dietary supplements than are nonrecipients. However, it analyzed neither the reasons for this practice nor the relationship to nutritional quality of the diets, health status, socioeconomic circumstances, or other contextual factors (Nayga & Reed, 1999). The purposes of the present research were to investigate the attitudes and beliefs toward supplement use among food stamp-eligible women to understand better the potential effects of policy changes in this population and to relate these findings to the earlier policy dialogue about this issue, including the discussion of policy goals, strategies, and criteria for selecting among them.

Methods

Study Sites and Sampling

The purpose of this research was to clarify the perspectives about nutrient supplement use rather than to obtain population-level estimates of the distribution of particular beliefs. Qualitative methods were used by two researchers trained in qualitative research techniques (Miles & Hubberman, 1994) to elucidate attitudes and beliefs of food stamp-eligible women concerning food, health, and nutrient supplements. Member checks and peer debriefing²

²A *member check* involves obtaining feedback from respondents on the interpretation of the data following the analysis; *peer debriefing* involves discussing the analysis and interpretation of the data with other researchers (Miles & Hubberman, 1994).

were techniques used by both researchers to enhance the reliability and credibility of the data (Kraak, Pelletier, & Dollahite, 2000).

Three study sites were selected to provide ethnic and regional variation among food stamp-eligible individuals who were nutrient supplement users or nonusers. A purposeful sample was obtained at each study site and was based on ethnicity (African American, White, Latina, and Asian), eligibility for food stamps (current recipient and/or former recipient), and use of supplements (user or nonuser). Each case was reviewed and classified according to the usual supplement-use habits. For instance, women were categorized as *users* if they occasionally used supplements whenever the supplements were needed or when they remembered to take them. By contrast, women were categorized as *nonusers* if they took a prenatal multivitamin/mineral only during pregnancy, as advised by their physician, but did not use supplements preceding or following their pregnancy. The interviews were conducted in urban locations including New York; San Francisco, San Jose, and Oakland, California; and Fort Smith, Arkansas.

With the assistance of the Cooperative Extension staff in each site, we recruited 72 individuals—6 from each ethnic group in each location. Efforts were made to recruit participants who were food stamp-eligible adult women, at least 18 years old, who had received or were receiving food stamps, and were not pregnant or breastfeeding. The final sample consisted of 24 individuals in New York (NY), 25 in California (CA), and 23 in Arkansas (AR). Participants in NY were drawn from the Expanded Food and Nutrition Education Program (EFNEP). Those in CA and AR were drawn either from the EFNEP and Food Stamp Nutrition Education Program (FSNEP) or

contacted with the assistance of organizations serving the population that met the sampling criteria.

The age range for the 72 participants was 19 to 75 years. Thirty-eight of the final sample used supplements, 34 did not; 37 were food stamp recipients, 34 were not; and 1 respondent was unclear about her use of supplements. The final sample consisted of 19 Whites, 16 African Americans, 20 Latinas, and 17 Asian Americans. Most interviews were conducted in English among bilingual interviewees; in interviews with three Asian participants, a bilingual interpreter was used.

Eligibility for EFNEP in the participating States required a family income less than or equal to 185 percent of the poverty level; whereas, eligibility for FSNEP was less than or equal to 130 percent of the poverty level. Specific questions about income were not asked, but participants were asked to identify all of the food assistance programs they knew they were eligible for and had participated in. Some EFNEP participants may have been ineligible to receive food stamp benefits. Current or former food stamp recipients made up 38 percent of the sample in NY, 52 percent in CA, and 65 percent in AR.

Interview Guide, Data Collection Methods, and Analysis

Qualitative methods were used for data collection and analysis (Miles & Hubberman, 1994). A semi-structured, open-ended interview guide was used to elicit participants' views and attitudes concerning the following areas:

- attitudes about and participation in food assistance and nutrition education programs;
- eating habits;
- beliefs about the adequacy of food-based nutrients in the average American diet;

- beliefs about the general attributes of a healthy person;
- perceptions about their own health status;
- personal health concerns;
- health-promoting or health-detracting behaviors;
- intentions to adopt health-promoting behaviors;
- perceptions about the meaning of the term *supplement*;
- specific supplement-use habits;
- influences promoting nutrient supplement use;
- reasons for not using or discontinuing supplements;
- beliefs about the benefits and drawbacks of allowing the use of food stamps to purchase nutrient supplements in addition to food; and
- opinions about who—the government or food stamp recipients—should decide how food stamps could be used if the policy changed.

After receiving input from staff of the Cooperative Extension program, we pretested and modified the interview guide for each site. Interviews were taped and transcribed verbatim. Data from the transcripts, demographic information, and field notes were used to analyze the qualitative data.

A consolidated summary was generated from the ethnic- and geographically based summaries of pertinent emergent themes. An in-depth analysis of key themes was undertaken in four specific categories:

- Nutrient supplement users receiving food stamp benefits
- Nutrient supplement users not receiving food stamp benefits
- Nutrient supplement nonusers receiving food stamp benefits
- Nutrient supplement nonusers not receiving food stamp benefits

About one-half of the participants described a supplement as a substitute or a replacement for food. About one-quarter of the participants described it as something taken in addition to the nutrients one could obtain from food, and another quarter expressed uncertainty about the purpose or role of a supplement.

These categories emerged as more important themes than the regional and ethnic categories used to obtain the heterogeneous sample. Emergent themes were incorporated into a conceptual framework describing the attitudes, beliefs, and practices of the women. Examples were chosen to illustrate the breadth of results for each question in the interview guide. The research site (NY, CA, AR), participants' ethnicity, supplement status (user vs. nonuser), and food stamp status (recipient vs. nonrecipient) are indicated after each quote. In some cases, approximate percentages are provided to give a sense of the number of women who expressed a certain viewpoint, although population representativeness should not be inferred.

Results

Attitudes and Beliefs About the Adequacy of Food-Based Nutrients

Two major themes emerged from this question: "Can the average person get all the vitamins and minerals he/she needs to be healthy, from the average U.S. diet, without taking a multivitamin and mineral pill?"

Theme 1: Roughly 60 percent of participants believe it is possible to get all nutrients from food, but most people do not do what is necessary to achieve that goal because of one or more of the following:

- fast-paced and stressful lifestyles
- ease and convenience of eating "junk" food
- lack of attention paid to the diet until chronic diseases develop
- lack of knowledge about what to select and prepare to meet needs

- lack of precision in serving sizes to eat according to the *Food Guide Pyramid*
- personal preferences that influence food choices that may not be nutritious
- time and money required to make wise decisions (especially challenging for low-income working mothers)
- the perception that healthful foods are too expensive to afford on a limited income

Theme 2: Less than one-quarter of respondents said it is *not* possible for a person to obtain all necessary nutrients exclusively from food because certain health conditions might require people to take nutrient supplements. Also, respondents had concerns about how food is produced and processed with special reference to nutrient losses, use of pesticides, and food additives and/or preservatives that were believed to change the nutrient value of food.

Illustrations of the participants' attitudes and beliefs about the adequacy of food-based nutrients and the role of nutrient supplements appear in the box on page 25.

Perceptions Concerning the Role of a Supplement

When participants were asked, "What comes to mind when you hear the word *supplement*?" the responses followed three themes. About one-half of the participants described a supplement as a substitute or a replacement for food. About one-quarter of the participants described it as something taken in addition to the nutrients one could obtain from food, and another quarter expressed uncertainty about the purpose or role of a supplement.

Illustrative statements of people's attitudes and beliefs about adequacy of food-based nutrients and the role of supplements

"Can the average person get all the vitamins and minerals he/she needs to be healthy from the average U.S. diet, without taking a multivitamin and mineral pill?"

Time and money to make wise food choices and/or to prepare nutritious foods were lacking.

"Yes, if they eat right. If they have their diet balanced right, I believe they can, but most people don't do that. It's our culture . . . our society in America. You just slam food into your mouth and keep running. The way the government has made it, people have to work to live, and they don't take the time out for themselves. It's really a labor of love. You really have to dedicate every day, commit, and I'm thinking about this right now . . . 'How can I bring a lunch to work that's more nutritious?' . . . A lot of people don't have the time or energy to commit that way." *CA, White, supplement user, former food stamp recipient*

Food preferences influence food choices that may not provide all the nutrients people need.

"No and that's why I think I need to eat my vitamins because I don't get enough. This food guide program of so much of this and that. . . . I don't follow it. I get three servings of fruits and vegetables out of five. . . . I am lucky that I like them. Even if I try, I am not very precise with my servings, and that is why I think I don't get all the nutrients I need." *CA, Latina, supplement user, non-food stamp recipient*

Food production techniques affect nutrient availability.

"No, the good stuff [food] is too expensive because they [retailers] know it's good. Sometimes when they grow it with that . . . I don't know how to explain it, I don't know all the terminology of it but for it to grow faster, it doesn't have all its nutrients, [and] half the time when people buy it, they don't cook it right" *AR, White, supplement user, former food stamp recipient*

Certain health conditions might require people to take supplements.

"No . . . sometimes it is good to take vitamins . . . you go to the doctor and he prescribes for you how much you must take and how often . . . some people need to take more because they don't have enough of something or they've become anemic" *NY, White, supplement user, non-food stamp recipient*

"What comes to mind when you hear the word supplement?"

A supplement is a substitute or replacement for food.

"It's like a second thing . . . that supplies . . . it's a replacement I would think. . . . it's like the fruits and vegetables; you can get better vitamins from them than pills, but sometimes when you can't take all the foods that you need, you can take a pill . . . ; it's not the best thing but it helps." *AR, Latina, supplement user, non-food stamp recipient*

A supplement adds extra to the nutrients obtained from food.

"Something that gives you additional help, extra help. . . . it actually gives you more support for your body, the necessary nutrients for your body because you don't have enough from the food." *CA, Asian American, nonsupplement user, non-food stamp recipient*

There is uncertainty about the role or purpose of a supplement.

"It helps somehow [to] control the disease or something like that. . . . It's for your memory, and you can go to sleep easier. It's very good if that person is a woman and if she is pregnant. . . . [I]t is very good for her child . . . and for the elderly. Oh, I don't know, I am not sure." *CA, Asian American, nonsupplement user, non-food stamp recipient*

Perceptions of Health Status

The participants were asked a series of questions about what constitutes good health, their perceived health status, and any healthful or unhealthful activities they engaged in. They were asked, "Do you consider yourself to be healthy?" (table 1). In general, the women described health status along a continuum of well-being, with roughly equal numbers expressing these three views: (1) they did not feel healthy, (2) they were somewhat healthy but could make changes to improve their health, and (3) they were healthy.

The primary difference between the non-food stamp recipients and the current or former food stamp recipients is that the latter group reported more health problems, regardless of supplement use. Some women said they were not healthy because of chronic diseases such as diabetes, hypertension, obesity, asthma, and arthritis. Some also indicated that they had epilepsy, anemia, gastrointestinal problems, mental health conditions related to depression, and histories of substance abuse and domestic violence.

Reasons for Using Nutrient Supplements

Participants were asked whether they consumed anything besides food, for any reasons. Questioning was done to probe for the range of possibilities of supplement use. They were then asked whether they took any vitamin or mineral pills, and if they answered "yes," they were asked what they took (either generic or brand names were offered), the dosage, and how often they took the vitamin or mineral supplement. They were also asked the reason(s) for taking supplements, the means by which they obtained them, the estimated cost of the supplements, how they were paying for them (e.g., out-of-pocket cash or insurance reimbursement), and any other

information about dietary supplements (e.g., herbs) that they and/or other household members were taking.

The responses were categorized into eight emergent themes that related to

1. Brands of supplements used by adults
2. Supplement use by children
3. Reasons for use of single-nutrient supplements
4. Dosage of supplements
5. Income constraints and patterns of supplement use
6. Acquisition of supplements
7. Promotion of supplement use by influential figures
8. Media influence on supplement use

Multivitamins/multiminerals were the most common nutrient supplement taken by the participants. Family members usually took the same brand. Some women and family members took supplements with added nutrients beyond a standard multivitamin formulation.

Children were most often given either multivitamins or nutrient supplements containing specific micronutrients such as vitamin C and zinc. Parents who did not take supplements themselves often ensured that their children took a daily multivitamin.

"My husband doesn't [take vitamins], but my kids take a generic multivitamin with extra vitamin C; . . . off the top of my head, I don't know [how much vitamin C], but they each take one of them. I just assumed that it would be better for them because they have so many different choices, and I just hear so much about vitamin C being so important for people. . . that's why I grabbed that one. . . . [I]t was just something I thought they needed, and of course, just

about everything I buy is generic because when you are on a low income like we are, you have to stretch your dollars as far as you can. Sometimes it's hard, but I just thought . . . they've all been healthy. . . . I've been pretty lucky." *AR, White, nonsupplement user, current food stamp recipient*

Single nutrient supplements were taken either in addition to or instead of a multivitamin and often for specific reasons. Some women said it was important to purchase a multivitamin and mineral supplement if they thought it would provide a positive benefit such as improving their energy level, managing stress, building up their body reserves, preventing infections, or managing chronic diseases. Some participants were able to describe why they were taking supplements as illustrated in the example below. Others were unable to describe clearly what the supplements were supposed to do for them.

"I take a lot of herbs. I take Echinacea, calcium, magnesium with zinc, and I take 1,000 mg of vitamin C every day. I [also] take some beta-carotene."

[Interviewer: Why are you taking the calcium, magnesium, and zinc?]

"Because it builds bones I was a polio victim when I was 3 months old and so I take it to build up [my bones] . . . and then it's good for . . . what do you call it? Osteoporosis. The vitamin C keeps colds out because, as a diabetic, you can contract anything quickly. . . . [I]t stops the flu and colds and stuff. I took it through the winter and didn't have any problem."

AR, African American, supplement user, non-food stamp recipient

Table 1. Beliefs about personal health among food-stamp eligible women: "Do you consider yourself to be healthy?"

Perceived status	Illustrative statements	Respondents' characteristics
"I am not healthy . . ."	<p>"Not me because I get so tired at the end of the day. See, I work a lot, but I get so tired at the end of the day. I don't know if this is normal. . . . It's like when my husband come[s] home at night and he's trying even to talk to me, I can't even open my eyes to talk to him."</p> <p>"Oh, no, because I'm overweight. I've been that way pretty much all my life, and I think it's not due to what I eat. . . . it's because of what I like to do. I don't get enough exercise, that's the biggest part. If I exercised, I could be the size I wanted to be, but there never seems to be enough time in my day to take that time out for me. I eat stuff that's not considered healthy. I don't sit down and eat junk food like potato chips, but I don't eat what you would call good-for-you foods like fruits and vegetables. We eat them, but I try to make it more a part of my kids' [diet] than I do mine. . . . I think about them, but I don't stop to think about myself."</p>	<p>NY, White, supplement user, non-food stamp recipient</p> <p>AR, White, nonsupplement user, food stamp recipient</p>
"I am somewhat healthy . . ."	<p>"Yea, pretty much. I might contradict myself here because I know that I'm overweight. . . . I don't feel that it is causing me to be really unhealthy where I am dragging. . . . I could probably lose the weight and feel better."</p> <p>"No, because I don't really eat right. I eat about one meal a day sometimes, and then I will . . . snack throughout the day on chips and soda . . . you know, junk food. I don't eat right. . . . I consider myself to be somewhat healthy . . . healthier than . . . this is what I am trying to say. If I took vitamins, I don't think that would change anything."</p>	<p>AR, Latina, supplement user, food stamp recipient</p> <p>CA, White, nonsupplement user, food stamp recipient</p>
"I am healthy . . ."	<p>"Yea. I consider myself to be healthy. I eat the right types of foods, I hardly ever get sick with the flu or anything like that, and I exercise."</p> <p>"Yes . . . I'm a little overweight, but it's okay. . . . I don't have diabetes. . . . I haven't developed any of those diseases. I don't have heart disease yet. I've been trying real hard to keep it down. I'm trying to lose more weight."</p>	<p>AR, White, nonsupplement user, food stamp recipient</p> <p>NY, African American, supplement user, food stamp recipient</p>

... I thought I had ovarian cancer but it was [endometriosis]. I'm starting to feel better now ... and I'm taking vitamins, which I don't like to do. ... I don't like taking pills. I started 2 months ago. My nails are getting stronger, I'm feeling healthier, and my hair is growing faster. I take them every day. I love it because it is about \$5 for a 30-day supply. It's got the vitamin E, the magnesium and zinc, the herbal energy, and the rest of them ... the value pack. ... I pay my own cash for them." *AR, White, supplement user, former food stamp recipient*

Many participants were not always attentive to the dosage or brand of the supplements taken: They admitted taking less than what was recommended or not taking the supplements daily. Because these participants had limited incomes, they wanted the supplements to last longer.

"I take vitamin E for skin, vitamin C, and calcium. On the [vitamin E] bottle it says to take one pill three times a day but I only take one a day because I can't afford to buy 'em for three times a day." *AR, African American, supplement user, current food stamp recipient*

Most women living on limited incomes either paid for supplements themselves, received them through Medicaid or MediCal when a prenatal multivitamin or iron was prescribed, or received them from friends or relatives who would share their supplements or purchase supplements for the participants when resources were low.

"The prenatal vitamins ... when I ran out, I just didn't take them [any] more. ... They

gave them to me free at the clinic ... through MediCal. ... The kids take vitamin B, vitamin C, and the little kid vitamins. ... I pay for them out of my own pocket." *CA, African American, nonsupplement user, food stamp recipient*

Friends, relatives, and/or physicians most commonly recommended supplements. Pharmacists, dentists, and sales associates in health-food stores were identified less frequently as authorities encouraging supplement use. No participant identified a nutritionist or dietitian as a professional recommending supplement use.

The media was cited less frequently than were authoritative figures for influencing supplement use and was reported to have both a positive and negative influence on women's use of supplements. In some cases, the media messages influenced them to try something new. In other instances, the media messages promoting supplement use were disregarded, because the woman questioned the benefit of the products.

"I think they are just trying to get you to buy the product ... just like any commercial. For some people, it might be a good thing. I don't drink milk, so maybe I could take some type of calcium supplement. But if you eat right and do everything right, there is no need for that. They just want your money." *CA, White, nonsupplement user, current food stamp recipient*

One participant equated the side effects of medications with the potential side effects of nutrient supplements and stated that she avoided them.

"Yea, we've seen [the TV advertisements]. Well, they show all those side effects ... , and that scares me. ... [S]ide effects scare me to death. I took some antibiotics when I was sick, and I had some real bad side effects. [Interviewer: Is that different from a vitamin?] It's just the side effects that scare me." *AR, White, nonsupplement user, current food stamp recipient*

Reasons Why Women Do Not Take Nutrient Supplements

Several different themes were identified to explain why women chose not to take nutrient supplements. About one-quarter of the participants believed it was possible to get all the vitamins and minerals one needs from food.

"I don't take any vitamins because I get all the vitamins I need from the fruits and vegetables I eat." *AR, White, nonsupplement user, food stamp recipient*

Women and/or their children avoided or discontinued supplement use for reasons such as cost and the need to prioritize expenses; side effects such as nausea, dizziness, or constipation; potential or perceived side effects; and dislike of the taste by children.

"My kids will not take vitamins ... [T]hey don't like the taste ... [The vitamins] taste nasty [or] have a funny taste. ... [I]t's not like regular foods that you can prepare differently." *CA, Latina, nonsupplement user, current food stamp recipient*

The women cited several reasons for discontinued supplement use: a multivitamin could overstimulate the appetite, the supplements had previously not produced the anticipated effects, and for some women who were already taking pills for medical conditions, they did not want to take more pills. A few did not think about purchasing a multivitamin pill or nutrient supplement while grocery shopping.

The Use of Food Stamp Benefits to Purchase Nutrient Supplements

The responses of participants were divided into two groups concerning the use of food stamps to purchase nutrient supplements (table 2). The first group consisted of a minority of participants who believed that food stamps should be used only for food because (1) the monthly food stamp allowance was not adequate to meet a household's food needs especially in large families, (2) recipients should eat vegetables or fruits rather than take pills, and (3) a vitamin pill would not alleviate hunger or promote satiation as food could. The second group believed certain circumstances deserved consideration so that needy families could purchase nutrient supplements.

Several themes were identified to characterize the view of both food stamp recipients and nonrecipients who said it was a good idea to allow recipients to purchase a multivitamin and mineral pill with their food stamp benefits because it might (1) assist them in getting what they need nutritionally while living on a low income; (2) help parents save pocket money that could be used toward something else such as buying children's clothes or school supplies; and/or (3) improve food stamp recipients' overall health.

In Arkansas, three food stamp recipients expressed that taking a multivitamin would be less expensive than buying fresh fruit. Although they would have preferred to purchase fruit, they believed that taking vitamin C or a multivitamin would be the most practical and least expensive alternative for low-income families.

Some said that changing the FSP policy was a good idea *if* recipients could not buy healthful food. However, others said it was a good idea *because* they believed that food stamp recipients generally do not eat healthful foods. Other attitudes and beliefs shared concerning the benefits of supplements included these:

- Food stamp recipients should take one multivitamin instead of several vitamin or mineral pills.
- It is feasible to use food stamp benefits for supplements if recipient makes wise budgeting decisions.
- Supplement use would depend on the person or family situation.
- Supplement use could set a good example for children and might stimulate other healthful habits such as buying more healthful foods.
- It is easier to take a pill than to eat healthful food.
- Food stamp recipients need to be convinced of the benefit of taking a multivitamin and mineral pill regularly.

A few food stamp recipients suggested that the government offer a special coupon to families each month that could be used to purchase a designated supplement—similar to providing specific WIC commodities—but if recipients did not use the coupon, they would lose the benefit.

Most women living on limited incomes either paid for supplements themselves, received them through Medicaid or MediCal . . . , or received them from friends or relatives . . . when resources were low.

Table 2. Food stamp-eligible women's perceptions regarding the use of food stamps to purchase nutrient supplements

Perceived status	Illustrative statements	Respondents' characteristics
Group 1 "Food stamps are for food only because . . ."	<p>"I would rather buy food, because I get hungry and I need to eat . . . I like to eat. [A vitamin and mineral pill] won't do [anything] for me. . . . [T]he welfare office does not give you enough food stamps to have that luxury to also buy vitamins. I only get \$230 for my two daughters, and they are thinking that's enough for food for the whole month and it [isn't]! You really don't have that much money coming in to afford to buy that. You would rather have your kid eat food than a vitamin; . . . it would not be bad if a person receiving food stamps also had more income coming in if that is what they want to do."</p> <p>"You buy vitamins automatically with food stamps, because you're buying your fruits and your vegetables and stuff like that . . . so it's really the same thing."</p>	<p>CA, White, nonsupplement user, current food stamp recipient</p> <p>NY, African American, supplement user, current food stamp recipient</p>
Group 2 "Food stamps could be used to purchase nutrient supplements because . . ."	<p>"It would help because then that money I spend on my calcium, I could spend on something else. My kid always needs socks and underwear . . . he's growing so fast . . . Yea, I would probably [take] vitamins and [my son] would [take] vitamins, but vitamins and stuff like that are just outrageous. You just can't afford it! [If money wasn't an issue], I would probably buy [vitamins] to make sure I was getting what I was supposed to and what my body really needed, so that my body wouldn't break down, and I wouldn't have so many health problems."</p> <p>"I think that would be great, because a lot of people out there can't shop, and it would be just as easy to take a pill to stay healthier. Many times I've been low on food stamps, cooked for the kids, and went hungry. . . . I could have used that vitamin supplement."</p> <p>"I think a lot of your healthier foods are more expensive . . . [I]f you go to buy your fruits, other than bananas and apples and oranges, when you start buying for a family of seven, you're talking several bags of each. I think that to be healthier, you are going to have to spend more. . . . I think it's too expensive to eat what they <i>should</i> eat."</p>	<p>AR, White, supplement user, current food stamp recipient</p> <p>AR, White, nonsupplement user, current food stamp recipient</p> <p>AR, White, nonsupplement user, current food stamp recipient</p>

Perceived Drawbacks to Using Food Stamps to Purchase Nutrient Supplements

Several participants shared some possible drawbacks to allowing food stamp recipients to use their benefits to purchase supplements. They believed recipients might purchase supplements but not take them, might not give their children adequate food if household resources were spent on a supplement, might not be able to absorb the nutrients from a pill or may be allergic to the supplement, or might abuse the FSP by selling food stamp benefits or nutrient supplements for cash. They also thought that allowing recipients to purchase supplements might reinforce the perception that food is not needed if vitamins are substituted and that taking too many or high doses of supplements may be harmful.

Decisionmaking About the Use of Food Stamps

Participants were asked their opinion regarding who should decide how food stamps are used—either the government or recipients. Three themes emerged: they believed food stamp recipients should decide, the government should decide, or the government and people should work together to decide. More than half of the food stamp recipients indicated that the people rather than the government should decide how food stamps are used. Many acknowledged, however, that the government's position would be more heavily weighted because it provides the benefits.

Discussion

The FSP-supplement proposal, far from being a simple policy change, brings two relatively new concerns to the foreground with respect to the goals of the FSP: (1) Should the goals of the

FSP be broadened to include *health promotion* beyond that associated with achieving equity in food intake? A related question is whether the supplement proposal is an appropriate strategy for doing so. (2) Given the high prevalence of supplement use in the general population, should food stamp recipients have the same level of choice as the general population regarding how they obtain their nutrients (i.e., via foods or supplements)? A related question is whether the current FSP policy constrains such choice. This latter question reveals a concern for consumer autonomy as distinct from equity or health promotion. Autonomy has not been one of the stated goals of the FSP; for example, current regulations do not permit the use of food stamps to purchase prepared food away from home.

While equity, health promotion, and autonomy all are implicated in this issue, much of the debate has emphasized only one or another of these goals and has not examined the actual strength of the trade-offs among them. The findings from the present study are synthesized below, in order to shed light on these policy questions.

As shown in figure 1, women in this study appear to hold an overall philosophy regarding nutrient supplements that is shaped by their beliefs concerning the nutritional adequacy of food, the inadequacy of actual behaviors, perceived benefits and experiences, the concept of supplements itself, and their current supplement practices. This philosophy appears to be malleable and/or negotiable depending upon such factors as degree of self-reflection, the clarification of existing information or addition of new information (especially from influential interpersonal sources), or changes in the participants' health status or income. In a few cases in this study where participants believed their

diet was adequate to provide them with all the nutrients they needed, their general philosophy appeared less malleable.

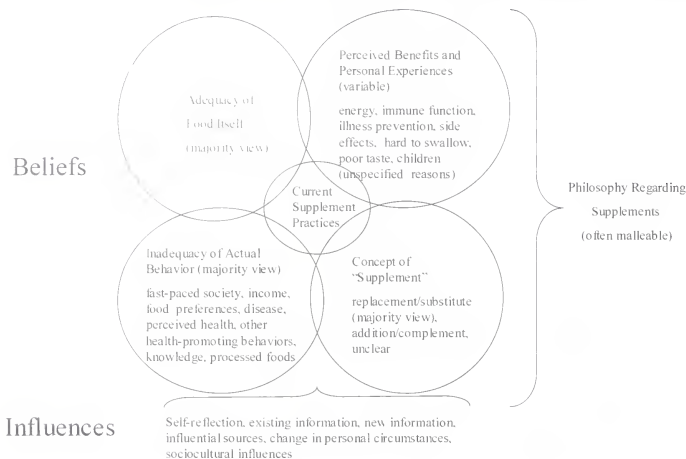
The most plausible prediction to be derived from these findings is that nutrient supplement use will increase in this population as long as the dominant narrative in their personal information networks and other influential sources is positive toward using nutrient supplements. Conversely, information from national authorities—as reported in the media or through programs such as FSNEP or EFNEP—concerning adverse events, lack of efficacy, or false advertising claims is unlikely to reach this population efficiently, although it may do so after an indeterminate lag time. Supplement use is predicted to increase under *both* the existing FSP policy and revisions in the policy, although it is likely to be more rapid and extensive under a changed FSP policy.

Implications for Policy Goals

In attempting to relate these predictions to equity in food access, health promotion, and personal autonomy, we find it necessary to consider the potential effect of increased use of nutrient supplements on total household expenditures, on the quality of food intake itself, and on other health-related behaviors. Moreover, it is necessary to examine more carefully the meaning of autonomy in light of the information asymmetries noted in the preceding paragraph.

Effect on Food Access. With regard to household expenditures, the expectation derived from household economics is that expenditures for supplements would reduce the income available for all other expenditures by an equal amount. That is, it would be subtracted from the *total* household budget not exclusively from the household *food*

Figure 1. Conceptual framework for food, health, and nutrient supplements among low-income, food stamp-eligible women



budget because only a fraction of FSP households (25 to 40 percent) currently purchase their entire food supply with food stamps (USDA, 1999). Most (60 to 75 percent) augment their food stamps with other income sources, indicating a substitutability between food and non-food expenditures, and they must do so to an even greater extent when they purchase supplements. This is true regardless of whether food stamps or cash is used to purchase the supplements.

A high-end figure of \$5/month (17 cents/day for a mother and two children as used by USDA [1999] and the average food stamp household of 2.4 persons in 1999 [with \$338/month net income plus \$162 in food stamps]), for example, would represent a 1-percent decrease in income available for all other expenditures. If all of this were subtracted from *non-food* expenditures, there may be no effect on food expenditures. If all of it were subtracted from *food* expenditures (which average \$224/

month for FSP households), the effect could be a 2.4-percent reduction (\$5) in food expenditures.

Using a different set of assumptions and methods, USDA estimated a low-end effect of 26 cents/month and high-end effect of 94 cents/month (0.4 percent) reduction. One of the major reasons for this difference (compared with the present estimates) is that the USDA method averages the effect across all FSP households; whereas, the present method emphasizes the potential effects on smaller subgroups (USDA, 1999). Notwithstanding these large differences among estimates in percentage terms, effects of this size do not appear to constitute a significant threat to food access, especially since households would retain the option of forgoing supplements in favor of purchasing food.

However, the policy change could have more serious implications for food access if it were to lead eventually to

changes in the way benefit levels are calculated. Specifically, if the base assumption for future Thrifty Food Plan calculations is that nutrient supplements can be used to meet some or all of a FSP recipient's vitamin and mineral requirements, especially for those that are relatively expensive from food alone such as folate, this could lead to significant reductions in benefit levels and, subsequently, food access. This is not a minor policy consideration.

Effect on Health Promotion. In theory, a change in the FSP policy could affect recipients' health in several ways. A benefit is that it could compensate for or enhance the vitamin and mineral intake of recipients who have unhealthful diets. A drawback is that it could compromise the quality of food choices and intake because of the belief that nutrient supplements are an effective substitute for food. Reports by the USDA and Life Sciences Research Office address the former possibility in considerable detail (Life Sciences

Research Office, 1998; USDA, 1999), and the present study does not add further insight into the findings. However, the present study does suggest the danger that greater supplement use in this population may lead to compromises in the quality of food choices and intake—especially if there is an implied government endorsement of supplement use as a result of a change in food stamp policy.

Implications for Autonomy. The majority of study participants expressed the view that food stamp recipients should not only make their own choices regarding supplement use (citing normative as well as pragmatic reasons) but also that the government should create the circumstances that would support recipients' choices. While these reasons have strong support from the perspective of ethics and welfare economics, respectively, this study also reveals some countervailing considerations that demand equal attention.

First is the documentation of a wide range of misconceptions concerning the purpose and role of a supplement, the nature of its benefits, and the degree to which the health benefits of food and supplements are substitutable. Even if there is no change in the current policy regarding supplements, these misconceptions deserve attention in current nutrition education programs for low-income populations. Second is the documentation that this population is likely to face significant information asymmetries because of the nature of their influential information sources, and will be unable to discover hidden quality defects on their own such as lack of efficacy and adverse consequences.

Both of these situations suggest a middle ground in which food stamp recipients could exercise autonomy in decisionmaking, but government should

take effective steps to correct potential information failures. Such steps would need to include the following: designing a clear and effective education initiative regarding the use of nutrient supplements; regulating labeling, advertising, and other forms of promotion based on the messages that are targeted for and understood by this population; and evaluating the extent to which an implicit government endorsement of multivitamin and mineral supplement use (and its associated promotion by the supplement industry and retailers) is generalized by members of this population to include higher doses and/or other forms of dietary supplements. (This latter possibility was not investigated directly in this study.) Finally, a policy change regarding supplements would require a variety of administrative changes to define eligible items; inform manufacturers, retailers, and consumers of these rules; and monitor and enforce compliance with these rules.

Strategies for Improving Food and Nutrient Intakes

If promoting the health of low-income Americans beyond that required for achieving equity is deemed a worthy policy goal, attention should then focus on the most effective and appropriate strategies to do so. Previous discussions have explicitly noted the logical fallacy of assuming that the most effective and appropriate strategy necessarily involves supplements or even the FSP itself (Life Sciences Research Office, 1998). Instead, this earlier analysis considered supplements, fortification, a variety of other incentives, and promotional or enabling strategies to improve food and nutrient intake to promote good health among food stamp recipients and low-income people in general. But even this is only a partial list of the potential strategies for pursuing one of the core public health goals as outlined in *Healthy People*

2010 (U.S. Department of Health and Human Services [DHHS], 2000).

Investigating the larger food environment of food stamp recipients would be appropriate for the purpose of promoting health and other food-system goals such as improving access to and the quality of supermarkets, supporting the capacity of institutions that serve low-income groups to purchase fresh produce from local farmers, and expanding the ability to use electronic benefit transfer cards at farmers' markets or for community-supported agricultural schemes. A systematic examination of potential strategies (and an effort to reconcile health, food security and food-system goals pursued by other government programs) does not appear to have been undertaken.

Conclusions

One version of the FSP-supplement policy dialogue maintains that a change in FSP policy would give program participants the same freedom to use nutrient supplements that other Americans have and improve their health and nutritional status at a lower cost than is possible through careful food selection. A decision to change the FSP policy based on this narrative would greatly overestimate the benefits associated with a multivitamin and mineral supplement in a population where nutrient deficiencies are rare. It would overlook the potential for negative consequences (i.e., decreasing the intake of nutrient-dense foods), and it would neglect the imperfections and asymmetries in the information available to food stamp recipients and the cost of government actions required to correct this class of market failures effectively.

A decision to change FSP policy further suggests that the net effect of proceeding with the policy change in the

absence of effective actions to correct for these market failures would be to shift some additional costs or risks onto an already disadvantaged population for the sake of little additional benefit, thereby raising serious ethical concerns.

This study reveals the need to conduct a more systematic examination of the potential strategies for improving the nutritional health of food stamp-eligible households and the importance of using a more complete list of criteria when attempting to identify the most effective and appropriate goals and strategies.

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Factors Affecting Meat Preferences Among American Consumers

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This study analyzed socioeconomic and nutritional factors affecting consumers' preferences for meatless meals and, specifically, meals with less red meat. Consumers' preferences were influenced by geographical location, racial and ethnic background, family composition, and household income. Although females were not statistically different from males in their preference for red meat, they generally preferred more meatless meals. Similarly, older respondents preferred more meatless meals and less red meat than did younger respondents. Meat was less preferred, as well, among American households in the highest income group. Advanced educational level of the respondents positively influenced the preference for meatless meals and meals with less red meat, and nutritional concerns among consumers also had a significant influence. Notably, compared with concerns for vitamins and minerals, concerns for cholesterol, fat, and sugar had a stronger effect on the preference for less red meat. Data such as those presented here can provide useful descriptions of the distribution of health-influencing behavior in our population.

Americans are consuming less red meat such as beef and more non-red meats such as poultry. In 1999 the per capita consumption of red meat was 117.7 pounds, an 11-percent drop since 1970 (U.S. Department of Agriculture [USDA], 2001a; USDA, 2001b). Poultry consumption, however, increased 102 percent during the same period (up to 68.3 pounds per person). In general, trends in consumption of animal products during the last 30 years involve more use of poultry, fish, lowfat milk, yogurt, and cheese and less use of red meat, whole milk, eggs, butter, and lard (USDA, 2001a). Although the decrease in the consumption of red meat has been compensated by an increase in the consumption of poultry to a certain degree, overall consumption of red meat has declined. Price, income, taste, and preferences are the key variables affecting the levels of meat consumption (Putnam & Gerrior, 1997).

Differences in retail price between beef and poultry may explain some of the decline in the consumption of red meat. For example, per pound prices of retail beef and poultry have remained at an average of \$3.70 and \$1.50, respectively (Bureau of Labor Statistics, 2001). Changes in income have relatively little or even a negative effect on the demand for red meat. For example, a report on food spending in American households in 1997-98 revealed that higher income groups, compared with the middle-income groups, decreased their total spending on beef (Blisard, 2001).

Besides relative prices and income, many other factors played key roles in changing the demand for red meat. According to a report by the U.S. Department of Agriculture's (USDA) Economic Research Service (ERS) (Putnam & Allshouse, 2001), consumer concern about cholesterol and saturated fat, inconsistent quality, and lack of

convenience in preparation are associated with the negative trend in beef demand. Increasingly, associations between consumption of red meat and the onset of chronic disease have been reported. Examples include links between (1) metastatic prostate cancer and intakes of red meat and dairy products (Michaud et al., 2001) and (2) colon and other types of cancer and high consumption of red meat combined with low intakes of dietary fiber, fruits, and vegetables (Law, 2000).

Additional research has shown that people reduce their risk for colon cancer when they substituted lowfat dairy products for high-fat versions, margarine for butter, poultry for red meat, and whole grains for refined grains (Slattery, Boucher, Caan, Potter, & Ma, 1998). These findings exemplify the enormous body of literature linking patterns of overall dietary intake with increased risk for cancer and other chronic diseases.

Specific dietary patterns that begin during childhood—such as the consumption of high-fat dairy products and red meats—are likely to increase age-specific rates of cancer and other diseases in adult life; however, the risk may be reversed with later dietary change. For example, a reverse in childhood dietary patterns is demonstrated by more younger Americans becoming vegetarians. About 15 percent of the 15 million U.S. college students eat vegetarian meals during a typical day (Walker, 1995). In a similar study of 158 British undergraduate students, more females than males had avoided red meat. The main reason given was related to concerns for health and sensory factors (Santos & Booth, 1996).

Our study analyzed socioeconomic and nutritional factors affecting consumers' preferences for meatless meals and,

Table 1. Change in consumption of meatless meals and red meats

Response	"You are eating more meatless meals than you used to"	"You are eating less beef, pork, or lamb than you used to"
	<i>Percent</i>	
Strongly disagree	34.97	38.52
Somewhat disagree	19.57	22.30
Neither agree nor disagree	7.84	9.23
Somewhat agree	15.36	11.36
Strongly agree	22.26	18.59

n = 2,880.

specifically, meals with less red meat. Nutritional concerns related to meat were examined. A regression analysis was performed to identify statistically significant socioeconomic and demographic characteristics, as well as nutritional concerns influencing consumer preference.

Methods

Data and Sample

The data set used in this study was part of a nationwide telephone survey of 2,880 U.S. households conducted by the Gallup Organization in 1997 for the National Peanut Association (National Peanut Council, 1997). The survey used a probability sampling method and included adults only. Gallup used a multiple-call-back method to eliminate bias in favor of those easy to reach by telephone. A 95-percent confidence interval revealed a maximum expected error range from the sample at ± 3.1 percent.

Survey questionnaires included consumers' stated changes in meat consumption (if any), as well as nutritional concerns while selecting foods. Four market regions (West, Midwest, Northeast, and South) were identified, and these divisions were consistent with the designations of

geographical regions by the U.S. Bureau of the Census. Demographic sample means compared well with population averages. For example, 85 percent of the U.S. population is White; 51 percent is female. The sample population was 84 percent White and 57 percent female. The regional distributions of the sample and the U.S. population were nearly identical.

Variables

The dependent variables were developed from consumers' stated changes in meat consumption based on their responses to a 5-point scale: strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, or strongly agree. The change in overall meat consumption was measured with the statement: "You are eating more meatless meals than you used to." The change in the consumption of red meat was measured with the statement: "You are eating less beef, pork, or lamb than you used to." Although most of the respondents either strongly disagreed or somewhat disagreed that they were eating more meatless meals or less red meat, more than 38 and 30 percent somewhat agreed or strongly agreed that they were eating more meatless meals and less red meat, respectively (table 1). These percentages represent an important change in the preference

for meat, particularly red meat, considering the large percentage of respondents who were eating meat and dairy products. Gallup poll data showed that 90 percent of the respondents normally consumed red meat, 93 percent consumed fish and poultry, and 94 percent consumed dairy products (National Peanut Council, 1997).

Geographic region, household income, race, gender, marital status, household type, education, and age of the respondents were the demographic variables used in the regression models (table 2). About one-third (33 percent) of the respondents lived in the South, four of five (84 percent) were White, and more than half (51 percent) were women. Over half were married (56 percent) and resided in households with children (53 percent). These respondents, on average, had attended at least some college, were 45 years old, and had a gross annual household income just under \$40,000.

Respondents were asked the following nutrition-related question: "When you choose the foods you eat, please tell me how frequently you consider the following issues, using a 10-point scale, where 10 means you consider nearly all the time (NAT), and 1 means you almost never (AN) consider it." The nutrition issues included cholesterol, fat, vitamins and minerals, and sugar. As expected, mean responses were generally neutral: On average, households tended to consider both desirable (vitamins and minerals) and undesirable (cholesterol, fat, and sugars) nutrition factors "sometimes" when making food-purchase decisions. However, the responses varied considerably.

Empirical Model

An ordered probit regression model was used because the preference variable was measured with a scale that allowed the outcomes to be ranked.

Table 2. Socioeconomic status and nutrition concerns when selecting food items

Variables	Percent
Geographic region	
Northeast	19.7
South	33.7
Midwest ¹	25.5
West	21.1
Race	
White	83.6
African American	7.4
Other ¹	9.0
Gender	
Men ¹	43.1
Women	56.9
Marital status	
Married	55.5
Unmarried ¹	44.5
Household type	
Household with children	37.5
Household without children ¹	62.5
Education	
No college ¹	37.9
Some college or higher	62.1
<i>Mean</i>	
Age	45.0
Household income	\$39,900
Nutrition concerns²	
Cholesterol level in food ³	5.6
Amount of fat ³	6.7
Vitamins and minerals ³	5.0
Sugar ³	5.1

¹Reference group in the regression model; other consists of Asian Americans, Hispanics, and Latin Americans.

²Scores ranged from 1 to 10, where 10 = very concerned.

³Coefficient of variation: cholesterol, 60.23; fat, 47.59; vitamins and minerals, 60.58; and sugar, 61.33.

n = 2,880.

In our study, women respondents were not statistically different from their male counterparts about their preference for red meat, although they preferred more meatless meals.

The empirical model is defined as

$$Y_t^* = \beta' X_t + \epsilon_t$$

where Y_t^* is an unobserved preference for meat; β is the vector of unknown parameters; X_t is a vector of four nutritional concern variables and sociodemographic variables hypothesized to affect the overall preference for meat and red meat; and ϵ_t is the independently and identically normally distributed error term. While Y_t^* is unobserved, respondents actually report preference by selecting one of the five categories (Y_t) representing consumers' like or dislike of meat in general and red meat in particular. Values for Y_t are 1 through 5, where 1 represents strongly disagree and 5 represents strongly agree to the statements: "You are eating more meatless meals than you used to," and "You are eating less beef, pork, or lamb than you used to." The unknown parameter vector in the empirical model, β , was estimated by using LIMDEP software (Greene, 1995).

The results of ordered probit models were interpreted by using the partial change or marginal effects on the probability of ordinal outcome. In doing so, the independent variables—other than the one being examined—were held constant at their mean values.

Results

Results from the ordered probit regression models for consumer preference for meatless meals and less red meat are reported in table 3. In addition, regression models were used to determine the marginal effects of the independent variables on consumers' preferences for meatless meals and less red meat (tables 4 and 5). The chi-square statistics for both models rejected (at the 0.01 level) the null hypothesis that all parameters were

Table 3. Consumer preference for meatless meals: Results of ordered probit models

Variables	Prefer more meatless meals		Prefer less red meat	
	Coefficient	Standard error	Coefficient	Standard error
Constant	-0.2840*	0.1749	-0.4243*	0.1420
Northeast	0.1350*	0.0824	0.2269*	0.0683
South	-0.0363	0.0727	0.1092*	0.0588
West	0.1396*	0.0820	0.3007*	0.0674
White	-0.0198	0.1175	0.0031	0.0880
African American	-0.0221	0.1515	0.2071*	0.1197
Women	0.3374*	0.0611	0.2786	0.0481
Married	-0.1557*	0.0643	-0.0472*	0.0520
Households with children	-0.2442*	0.0677	-0.1612*	0.0524
Some college or higher	0.1762*	0.0626	0.1528*	0.0506
Household income	0.0044*	0.0016	0.0027*	0.0013
Age	0.0070*	0.0021	0.0093*	0.0018
Cholesterol level in food	0.0315*	0.0106	0.0312*	0.0088
Amount of fat	0.0244*	0.0111	0.0240*	0.0093
Vitamins and minerals	0.0227*	0.0107	0.0058	0.0085
Sugar	0.0322*	0.0106	0.0231*	0.0087
μ (Threshold parameter 1)	0.5566*	0.0393	0.3680*	0.0239
μ (Threshold parameter 2)	0.7907*	0.0501	0.6102*	0.0304
μ (Threshold parameter 3)	1.4312*	0.0824	1.2136*	0.0443
Log likelihood function value	-3145.30		-3075.55	
Log likelihood function value (Restricted; $\beta=0$)	-3263.37		-3213.44	
χ^2	236.15*		275.79*	
Maddala's Pseudo R^2	0.10		0.12	

*Significant at $p \leq 0.10$.

jointly zero. Maddala's pseudo R^2 , used to evaluate the fitness of the models (Long, 1997), was 0.10 for the preference for meatless meals and 0.12 for less red meat. For cross-sectional data with categorical dependent variables, the pseudo R^2 is often small (Gujarati, 1995). Based on diagnostic tests (Belsley, Kuh, & Welsch, 1980), no collinearity problems were detected in the analyses.

Consumers' preferences for meatless meals and red meat were influenced by socioeconomic variables and nutrition concerns. For example, households living in the Northeastern and Western United States preferred more meatless meals and less red meat, compared with those living in the Midwest (table 3).

Differences between Midwestern and Southern States regarding the preference for meatless meals were not significant. The results are consistent with the livestock-related economics of the country. Large numbers of households in the Midwest depend on the livestock industry, particularly beef; this may influence preferences toward meat and red meat in general. African Americans were less likely than other racial groups (Asian Americans, Hispanics, and Latin Americans) to prefer red meat. A difference in attitude toward meat and red meat consumption associated with differences in ethnic background was reported previously in a comparative study that tested for ethnic differences in consumption of dietary fat in a community-based

Table 4. Marginal effects of the independent variables on consumer preference for meatless meals

Variables	Disagree		Neutral	Agree	
	Strongly	Somewhat		Somewhat	Strongly
Constant	0.0695	0.0217	0.0044	-0.0068	-0.0888
Northeast	-0.0330	-0.0103	-0.0021	0.0033	0.0421
South	0.0089	0.0028	0.0006	-0.0009	-0.0114
West	-0.0342	-0.0107	-0.0022	0.0034	0.0437
White	0.0048	0.0015	0.0003	-0.0005	-0.0061
African American	0.0054	0.0017	0.0003	-0.0005	-0.0069
Female	-0.0826	-0.0258	-0.0052	0.0081	0.1055
Married	0.0381	0.0119	0.0024	-0.0038	-0.0486
Households with children	0.0598	0.0186	0.0038	-0.0059	-0.0763
Some college or higher	-0.0431	-0.0134	-0.0027	0.0042	0.0550
Household income	-0.0011	-0.0003	-0.0001	0.0001	0.0014
Age	-0.0017	-0.0005	-0.0001	0.0002	0.0021
Cholesterol level in food	-0.0077	-0.0024	-0.0005	0.0008	0.0098
Amount of fat	-0.0060	-0.0019	-0.0004	0.0006	0.0077
Vitamins and minerals	-0.0056	-0.0017	-0.0004	0.0005	0.0072
Sugar	-0.0079	-0.0025	-0.0005	0.0008	0.0101

sample of Hispanic and White adults with low educational attainment (Winkleby, Albright, Howard-Pitney, Lin, & Fortmann, 1994). The study reported high consumption of dietary fat among Whites with low educational attainment and increased consumption of fat among Hispanics at higher levels of acculturation.

Family composition and children in the households significantly affected the households' preferences for meatless meals and red meat. Households with children were likely to be concerned about nutritional balance in the diet. For example, zinc deficiency is known to occur in children's diets that are low in sources of readily bioavailable zinc such as red meat and high in unrefined cereals that are rich in phytates and dietary fiber (Sandstead, 1991).

In the study reported here, households with children and married-couple households preferred more meals with

meat and red meat than did the households without children and unmarried-couple households, respectively (tables 3 and 4). The probability that the respondents strongly agreed that they were eating meatless meals was lower by 5 percent among married respondents than that of unmarried respondents (table 4). Similarly, the difference in the probability of respondents in households with children, compared with their counterparts, strongly agreeing that they were eating meatless meals was as high as 8 percent.

Similar results were reported in a study among Australian married-couple households with children, where groups with lower mortality rates tended to spend more money on fruits, vegetables, cereal products, and fish, compared with groups with higher rates of mortality (Powles, Hage, & Cosgrove, 1990). In addition, households with these lower mortality rates spent substantially less on alcohol and substantially more on red meat.

Education level of the respondents positively influenced the preferences for meatless meals and red meat: Respondents with either college or an advanced level of education preferred to have more meatless meals and less red meat than did those with less than a college education.

Household income positively influenced consumers' preferences toward more meatless meals and less red meat. Increases in household income had positive marginal effects on the probabilities for other categories such as "somewhat agree" and "strongly agree" for more meatless meals and less red meat (tables 4 and 5). That is, each \$10,000 increase in annual household income increased the probability that respondents' "strongly agreed" they were eating more meatless meals and less red meat by 1.4 and 12 percent. The marginal effect is more impressive for less red meat than it is for meatless meals.

This result agrees with findings of the 1997-98 USDA report on *Food Spending in American Households* (Blisard, 2001), which showed that during the 2-year period of 1997-98, Americans in the highest income group spent only \$91.22 per person on beef, whereas the middle-income group spent only \$94.53. During the same period, the highest income group spent \$193.73 per person for *all* meat items. By comparison, the middle-income group spent \$196 for *all* meat items.

Nayga (1996) reported that income had significant and positive effects on consumers' use of information regarding undesirable nutrition factors such as fat, calories, and cholesterol. In another study, researchers showed that among Bulgarian households, concern about fat content in food items was positively related to their income (Moon et al., 1998).

Many studies have suggested a greater health concern among women, compared with men (Frazao & Cleveland, 1994; Nayga & Capps, 1994). In our study, women respondents were not statistically different from their male counterparts about their preference for red meat, although they preferred more meatless meals (tables 3 and 4). In

Table 5. Marginal effects of the independent variables on consumer preference for less red meat

Variables	Disagree		Neutral	Agree	
	Strongly	Somewhat		Somewhat	Strongly
Constant	0.1140	0.0386	0.0177	-0.0016	-0.1687
Northeast	-0.0007	-0.0002	-0.0001	0.0000	0.0010
South	0.0433	0.0147	0.0067	-0.0006	-0.0641
West	-0.0008	-0.0003	-0.0001	0.0000	0.0012
White	-0.0556	-0.0188	-0.0087	0.0008	0.0823
African American	-0.0411	-0.0139	-0.0064	0.0006	0.0608
Female	-0.0025	-0.0008	-0.0004	0.0000	0.0037
Married	-0.0748	-0.0253	-0.0116	0.0010	0.1107
Households with children	0.0127	0.0043	0.0020	-0.0002	-0.0188
Some college or higher	-0.0610	-0.0206	-0.0095	0.0008	0.0903
Household income	-0.0808	-0.0273	-0.0126	0.0011	0.1196
Age	-0.0293	-0.0099	-0.0046	0.0004	0.0434
Cholesterol level in food	-0.0084	-0.0028	-0.0013	0.0001	0.0124
Amount of fat	-0.0064	-0.0022	-0.0010	0.0001	0.0095
Vitamins and minerals	-0.0016	-0.0005	-0.0002	0.0000	0.0023
Sugar	-0.0062	-0.0021	-0.0010	0.0001	0.0092

related studies, Lin (1995) noted that females were more likely to believe food safety was very important in food shopping; and Guthrie, Fox, Cleveland, & Welsh (1995) reported that females were more likely to use nutritional labels in making food selections.

Education level of the respondents positively influenced the preferences for meatless meals and red meat: Respondents with either college or an advanced level of education preferred to have more meatless meals and less red meat than did those with less than a college education. The marginal effects of education on the dependent variables (tables 4 and 5) show that respondents with some college or higher education were 5 and 9 percent more likely to "strongly agree" that they were eating meatless meals and less red meat, respectively, than were those without some college or higher education. Presumably, respondents with a higher education read nutrition information and connected diet-disease relation-

ships (Nayga & Capps, 1999; Putler & Frazao, 1994). Thus, public health and nutrition education can raise the nutritional awareness of consumers by targeting those segments of the population with less education.

Our findings suggest that older respondents, compared with younger respondents, preferred more meatless meals and less red meat. Positive relationships between age and general health concerns were reported in previous studies. These include concerns for food safety (Michaud et al., 2001) and using food labels for nutritional information (Nayga, 1996).

Nutrition concerns that affect selection of food items had a positive influence on consumers' preferences for meatless meals and less red meat. In this study, as the level of concern for nutrition increased, consumer preferences for meat in general and red meat in particular were likely to decrease. Concerns for cholesterol, fat, and

sugar each had a stronger effect on the preference for less red meat, compared with vitamins and minerals. The magnitude of effects on the preferences for both meatless meals and red meat was highest for cholesterol concern, followed by sugar and fat concern. Although the data used in this study showed an association between red meat and consumers' perceived concern about sugar, it is important to note that red meat does not contain sugar. It is likely that consumers' general nutritional concern regarding food may not necessarily reflect their knowledge about specific nutrient content.

Conclusion and Implications

A regression analysis was used in this study to analyze socioeconomic and nutritional factors affecting consumer preferences toward meatless meals and meals with less red meat. Consumers' preferences for meatless meals and red meat were influenced by a number of socioeconomic variables such as geographical location, racial and ethnic background, family composition, and household income. There were differences between men and women and members of different age groups and at different educational levels. Although women were not statistically different from their male counterparts regarding their preference for red meat, they generally preferred more meatless meals. Nutritional concerns among consumers—particularly for cholesterol, fat, and sugar—also played a role in consumers' preferences. These results have important implications for public health and should be considered when developing campaigns related to health promotion or meat consumption.

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Educators' Reports of Food Acquisition Practices Used by Limited-Resource Individuals to Maintain Food Sufficiency

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Some food acquisition practices of limited-resource individuals were elucidated through interviews with nutrition educators who work regularly with this audience. Practices were characterized as either viable or questionable in terms of their potential risks. Practices used to acquire food, or money for food, included providing foster care, selling surplus food, switching price tags on food, purchasing food from private individuals, and seeking out and using road-kill. The foundation of a grounded theory regarding practices used by limited-resource individuals to maintain food sufficiency was originated. Additional research should verify these practices and determine their prevalence among limited-resource audiences, as well as the relative risk associated with using questionable practices. Food security indicators, nutrition education messages, and policies concerning limited-resource individuals may need to be addressed in light of these findings.

Food security has been defined as "access by all people at all times to enough food for an active, healthy life [and] includes, at a minimum, the ready availability of nutritionally adequate and safe foods, and an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)" (Anderson, 1990).

Food security, hunger, and food insufficiency have been broadly studied (Ahluwalia, Dodds, & Baligh, 1998; Alaimo, Briefel, Frongillo, & Olson, 1998; U.S. House Select Committee on Hunger, 1990). Research protocols on food acquisition, however, usually restrict questioning to shopping practices used in traditional shopping venues (USDA, 1997; U.S. House Select Committee on Hunger, 1990), particular populations such as the elderly, or specific practices such as

food budgeting (Dinkins, 1997; Kendall, Olson, & Frongillo, 1998; Wolfe, Olson, Kendall, & Frongillo, 1996). Few studies have explicitly researched the practices that limited-resource individuals use to obtain food and have considered that food acquisition may occur in nontraditional venues (Ahluwalia et al., 1998; Hamelin, Habicht, & Beaudry, 1999; Olson, Rauschenbach, Frongillo, & Kendall, 1997; Petchers, Chow, & Kordisch, 1989). Reporting accurate data—including the difficulties some Americans experience in getting enough food to eat—is critical for nutrition programs and policies (Carlson, Andrews, & Bickel, 1999).

Nutrition educators who work regularly with limited-resource individuals may have strong relationships with their program participants and therefore be keenly aware of the practices their clients use to maintain food sufficiency.

These educators—who may be accessed with greater ease, less time, and with lower cost—may be a reliable source for information pertaining to the limited-resource individuals they serve. Our research used this alternative source for information about food acquisition practices of limited-resource individuals.

Therefore, a study was designed to interview all EFNEP and FSNEP nutrition educators in New Jersey to identify the practices that their program participants reported using to maintain food sufficiency. In addition to identifying these practices, our other goal was to distinguish which practices posed risks such as those related to food safety.

Methods

Subject Selection and Data Collection

Semi-structured, in-depth interviews, approved by the Rutgers Institutional Review Board, were conducted with all 51 EFNEP and FSNEP educators throughout the State. This convenience, nonrandomized sample, representing a single State, consisted of 18 professionals and 33 paraprofessionals who had worked for either of the programs for at least 6 months. The interviews were conducted between September 1999 and January 2000 by a research team of two faculty members and two research assistants. Most interviews were completed in person and during work hours; three interviews were conducted via telephone because of inclement weather.

During the interviews, educators were asked to share stories about practices their program participants had discussed regarding the means they used to maintain food sufficiency. To focus the stories, the interviewers asked

these questions in the order in which they are listed:

- Think back to the classes that you have taught for EFNEP or FSNEP. What are common things that people have said that they do in order to get through the month with enough food?
- What things have people said they did to get through the month with enough food that surprised you?
- What things did people do to avoid running out of food, that when they obtained the food, it was unsafe or risky?
- What things have people done to avoid running out of food that seemed to be, or actually were, illegal?

The interviewer used other open-ended questions to gather additional details, and the interviewer who was not questioning the educator took extensive notes. Interviews were audiotaped. However, one educator preferred not to be audiotaped, so interviewer notes substituted for the transcript. At the end of each interview, educators were asked about their EFNEP/FSNEP work history and personal demographics.

Data Analysis

Verbatim transcripts of the audiotaped interviews were reviewed for accuracy and compared with the interview notes. Individual food acquisition practices were identified and physically cut from transcript copies. The four members of the research team independently used the constant comparative method (Glaser & Strauss, 1967) to organize into groups those practices that shared similar strategies of acquiring food. The researchers met to compare, contrast, and resolve differences, and then used the same approach to organize practices into even broader categories that

seemed to depict adequately the common themes of food acquisition. In the same manner, practices were examined to determine which ones were viable or questionable.

The researchers defined questionable practices as those that may have posed a food safety, nutritional, physical, financial, legal, or regulatory risk to the individuals who used them. To ensure the validity of these definitions, a fifth researcher, who was familiar with the literature in this area, carefully reviewed all findings and reported any inconsistencies between the literature and researchers' classifications. Data classification was performed with the vision that this work would form a portion of the basis of a grounded theory concerning practices that limited-resource individuals use to maintain food sufficiency (Glaser & Strauss, 1967). In turn, this information could be used by nutrition educators to tailor messages and by policymakers to examine practices that put individuals at risk for food insecurity.

Results

The educators were females whose average age was 44.5 and who had worked in their occupational fields for an average of 7.1 years. Forty-five percent were Caucasian; 25 percent, African American; and 19 percent, Hispanic. Nine percent did not specify their race/ethnic group.

Two main themes emerged from the interviews with the educators: (1) practices employed by limited-resource people with the intent of obtaining food and (2) food management practices (discussed in another paper [Kempson, Keenan, Sadani, Ridlen, & Rosato, 2002]). Four categories of food acquisition practices were identified from the stories shared by the educators: (1) Rely on Resources

Offered in the Community, (2) Interact with Informal Support Systems, (3) Supplement Financial Resources, and (4) Lower Food Costs by Using Shopping Strategies.

Rely on Resources Offered in the Community

EFNEP/FSNEP educators reported that their clients—limited-resource individuals—used three major strategies within community systems to maintain food sufficiency: Clients were reported to (1) participate in federally funded food programs, (2) attend events to obtain food, and (3) participate in locally sponsored food programs (table 1).

Participate in federally funded food programs. Federal food programs served as common venues through which food and money for food were obtained. Educators reported that limited-resource individuals participated in programs such as the Food Stamp Program; Head Start; school lunch and breakfast programs; and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) to maintain food sufficiency.

Attend events primarily to obtain food. Special events at various locations were attended primarily to take advantage of the food that was provided. In these cases, a church, business, or organization had offered food as an incentive to increase the turnout at an event, to market products, or to cater to attendees or customers. One educator stated:

“We have a coffee hour between each service . . . and there are a number of folks that come in for our coffee hour [and] do not stay . . . through the church service.”

Another commented that although the food is generally a lot of sweet items

Table 1. Food acquisition practices reported to be used by limited-resource audiences to maintain food sufficiency: Rely on resources offered in the community

Practices	Possible risk
Participate in Federal Food Programs	
Food Stamps	
Head Start	
School Lunch/Breakfast Programs	
The Special Supplemental Nutrition Program for Women, Infants, and Children	
Attend events primarily to obtain food	
Church fellowship	
Nutrition education class	
Happy hour at bars	
Stores offering samples	
Participate in locally sponsored food programs	
Food pantries	
Local programs	
Private businesses	
Nutrition sites for seniors and soup kitchens	
Shelters	
Private individuals	Food safety

that were baked and bagels, “it’s something to keep [their] stomach from growling.”

Educators observed clients attending an event primarily to obtain food. They noticed a rise in attendance at educational classes where food/commodities were available. This practice was particularly noticeable at the end of the month—presumably when funds began to run out. In some cases, class members asked the educator for food. Happy hours at bars and grocery stores offering samples were also visited by limited-resource individuals in an attempt to obtain food.

Participate in locally sponsored food programs. Food was also obtained through locally subsidized programs—such as church-sponsored food pantries, soup kitchens and shelters, venison recovery programs (e.g., Hunters for

the Hungry), Meals on Wheels, and nutrition sites for seniors. Turkeys and other foods were distributed by charities during the holidays. Private businesses, restaurants, diners, and fast-food establishments sometimes offered meals throughout the year, hosted holiday dinners, or provided food in other ways. For example, one restaurant owner, instead of throwing away food at the end of the day, prepared plates of food to give to the hungry. In addition, nutrition sites for seniors provided lunches to the elderly on a regular basis, soup kitchens provided hot meals, and shelters provided both a place to live and a source of food. Private individuals opened community assistance programs or organized neighborhood volunteer facilities that offered food. These programs could potentially be food safety hazards, because the individuals operating them were unlikely to have

Table 2. Food acquisition practices reported to be used by limited-resource audiences to maintain food sufficiency: Interact with informal support systems

Practices	Risks or possible risks
Exchange resources	
Sell surplus food	Food safety
Trade forms of public assistance	Nutritional; Illegal/regulatory
Manage personal resources	
Budget	
Establish store credit	Financial
Systematize payment of bills	Financial
Members of support system	
Ask for or borrow food or money	
Eat at others' homes	
Share information	
Borrow food stamps	Illegal/regulatory
Identify someone to live with	Nutritional; Physical

Budgeting, using credit, and cycling bill payments were practiced to conserve money for food.

expertise in safe food handling and were not required to follow government food safety regulations. This potentially placed the people they served at risk for foodborne illnesses.

Interact With Informal Support Systems

Personal support systems provided a network within which limited-resource individuals operated to maintain food sufficiency (table 2). EFNEP/FSNEP educators identified three major strategies their clients used.

Exchange resources. Excess supplies of specific foods, including rice, cereal, canned and packaged goods, and holiday turkeys, were mentioned by the educators as being sold for money with which other foods could be purchased. Also, public assistance monies, in the form of WIC vouchers for infant formula, were traded for food stamps. These practices not only may have threatened the infants' nutritional status, but they also violated program regulations.

Manage personal resources. Budgeting, using credit, and cycling

bill payments were practiced to conserve money for food. Hispanic communities reported that owners of nearby stores (i.e., a "bodega") often established an informal credit system with familiar customers. Those who purchased groceries on credit repaid the storeowner once they received their food stamps and/or paychecks, but these limited-resource customers continued to depend on credit for the next month's food. In other cases, bill payment was cycled so that the most urgent bills were paid first; other bills were paid later. As with buying groceries on credit, bill cycling provided only a short-term solution for obtaining food and could be financially risky if it is used long term.

Use members of support system. Interviews with EFNEP/FSNEP educators indicated that limited-resource individuals frequently collaborated and cooperated with members of their support system. They visited friends, neighbors, and family members to obtain food or money or to be invited to partake in a meal. Information learned from friends, relatives, neighbors, health

care and education professionals, paraprofessionals, and even in an opportunistic fashion, such as over-hearing a conversation, was used to find resources for food, to increase financial resources, to learn shopping strategies, and to manage household and personal food supplies better.

Often, food stamps were borrowed from others, and those who needed a place to live used neighborhood connections to learn of available residences and roommates. Many of these support systems included casual acquaintances and people involved in illegal activities, and thus these affiliations presented obvious physical risks. Theft presented nutritional risks.

Supplement Financial Resources

EFNEP/FSNEP educators identified six major food acquisition practices that their limited-resource clients used to supplement financial resources and maintain food sufficiency. The limited-resource clients used strategies to increase income and decrease expenses to improve their ability to acquire food (table 3).

Increase income through activities.

People provided foster care to make extra money or sold or pawned non-food items to acquire money for food. These non-food items included clothes, donated items, personal possessions, aluminum cans, and electronic equipment.

"People go to pawn shops to sell items that they already have, like jewelry, watches, . . . appliances, car titles . . . I've seen cases where people actually lost their cars because they didn't pay back the loan that they got for the title . . . They had food, but they lost their vehicle."

Table 3. Food acquisition practices reported to be used by limited-resource audiences to maintain food sufficiency: Supplement financial resources

Practices	Risks or possible risks
Increase income through activities	
Provide foster care	
Pawn or sell items	
Begging/panhandling	Illegal/regulatory
Earn unreported income	Illegal/regulatory
Engage in illegal activities	Physical; Illegal/regulatory
Gamble	Financial
Decrease expenses through activities	
Garden	
Acquire discarded food	Food safety
Seek road-kill	Food safety
Hunt and fish	Food safety; Illegal/regulatory
Access multiple pantries	Illegal/regulatory
Relocate to increase income	
Closer to public assistance programs	
Better employment opportunities	
Relocate to decrease expenses	
Inexpensive housing	
Housing with shared or unsecured food storage facilities	Nutritional
Abandoned building	Physical; Illegal/regulatory
Use programs to increase income	
Obtain Temporary Assistance for Needy Families	
Obtain general assistance	
Obtain Social Security Income	
Use programs to decrease expenses	
Get subsidized housing	
Participate in Self-Help and Resource Exchange (SHARE)	

Panhandling was commonly mentioned as a way to increase income for food acquisition. Babysitting, day work, sharing households with borders who were not mentioned on applications for public assistance, and preparing and selling homemade food were other means used to obtain money for food. One limited-resource client bought several cake mixes at the beginning of the month, made homemade cupcakes,

and then sold them for profit when her food allotment for the month was depleted. Although an industrious practice, earning unreported income and selling without a license are illegal.

Other illegal activities were also pursued to increase income. For example, meat or non-food items were stolen from stores or individuals and then sold or pawned. EPNEP/FSNEP

educators reported that their clients stole food from family members during mealtime visits, from establishments where individuals worked, or in the case of migrant farm workers, from crops.

Adults, whole families, and children were involved in manufacturing, distributing, and selling drugs illegally.

"... this started when he was about 5 years old and some of the older kids in the neighborhood would ... send him around the corner with one paper bag. And then he would have to come back with another paper bag. And they would ... give him a couple of quarters, or whatever, for every time he came around the corner. That was how money was coming, and that was how he got food for himself."

In addition to the legal ramifications, these practices placed individuals at risk of physical harm.

Legal and illegal gambling, such as buying lottery tickets or participating in sports' pools, was another way people attempted to acquire money for food.

"They thought [that if] they'd spend a dollar here, maybe they could win a couple million. You [wouldn't] have to ever worry about food again."

If overused, gambling can lead to financial problems that negatively affect people's ability to maintain food sufficiency.

Decrease expenses through activities. Multiple practices to decrease expenses were used to reduce food costs, and therefore improve limited-resource individuals' ability to acquire food.

Gardening was mentioned as a viable method; going through dumpsters and picking up discarded food were questionable methods that placed participants at risk for foodborne illnesses.

Hunting and fishing, although often done legitimately, were questionable practices in many cases (e.g., hunting deer after dark or fishing in contaminated waters).

"There are quite a few people in our area who fish. And they just really don't even try to find out whether [the water] is contaminated or safe."

Sometimes road-kill was sought. EFNEP/FSNEP educators told of some limited-resource clients who sought road-kill and then took it home as a source of meat. When road-kill could not be found, it was created.

"... just run the animals over with the car and pick them up and put them on the hood of the car and take them home."

Hunting, fishing, and seeking road-kill, as described, all posed potential food safety risks.

Finally, the educators shared stories of people traveling to multiple pantries and soup kitchens to obtain the food they needed. In many cases, this violated the regulations of the food pantries.

Relocate to increase income and decrease expenses. Relocation was used to increase income with which to purchase food. According to the EFNEP/FSNEP educators, some of their limited-resource clients moved to suburbs or into cities to be closer to public assistance programs and public transportation. In other cases, individuals or families transferred to less

populated areas, where employment was more readily available.

Finding inexpensive housing was a practical way to decrease expenses, which also left more money for food. Living in facilities with common food storage areas helped to defray living expenses.

"You had a lot of rooming houses, and there would be three or four people in one room. And that would be a way of getting food, too. Because if you did have three or four people in one room ... everybody was sharing [his or her] food from the food banks, so it would last a little longer."

Residents of facilities (e.g., some shelters, transitional housing, YMCA's, and rooming houses) with shared food storage areas frequently stole from each other, putting individuals at risk nutritionally from a lack of sufficient food. One educator spoke about a personal experience: "... leave a can of food in your room and the next thing you know, it [would] be gone [because of theft]." Residence in abandoned buildings, although illegal and physically unsafe, was also reported.

Use programs to increase income and decrease expenses. Temporary Assistance for Needy Families, General Assistance, and Social Security Income (SSI), according to EFNEP/FSNEP educators, were used by their limited-resource clients to increase financial resources and reduce potential food insufficiency. Also, obtaining subsidized housing and participating in the Self-Help and Resource Exchange (SHARE) Program were means used to decrease expenses. Volunteer work is a required aspect of this program, but the educators reported that this did not often happen. Whether increasing income or decreasing expenses, these

Regularly attending events primarily to obtain food—such as church fellowships, nutrition education classes, happy hours, and stores offering samples—did result in obtaining food but is generally considered to be a socially unacceptable practice to acquire food.

Table 4. Food acquisition practices reported to be used by limited-resource audiences to maintain food sufficiency: Lower food costs by using shopping strategies

Practices	Risks or possible risks
Purchase food from low-cost sources	
Discount stores	
Private individuals and vendors	Food safety
Shop for low-cost and value foods	
Bulk foods	
Inexpensive foods	
Coupons	
Nearly expired food	
Sale items	
Dented and damaged packages	Food safety
Expired food	Food safety
Engage in illegal shopping practices	
Shoplift food	Illegal/regulatory
Switch price tags on food	Illegal/regulatory

practices served as means through which food sufficiency could be maintained.

Lower Food Costs by Using Shopping Strategies

According to the EFNEP/FSNEP educators, their limited-resource clients used three major food acquisition practices to maintain food sufficiency. Most of these practices were legal, but a few posed food safety or regulatory risks (table 4).

Purchase food from low-cost sources. Discount stores such as wholesale bread outlets, meat and poultry stores, and produce outlets offered low-cost food.

"It's like six cans of peas for a buck. So they buy more staple foods like canned vegetables, stuff like that so they can have it on the shelf It might not be a piece of meat, but they have vegetables."

Inexpensive food was purchased from farmers and neighborhood gardeners and from individuals (unofficial and unregulated "street vendors") who sold food from unknown sources. Meat was purchased from butchers who slaughtered animals in their homes. The safety of the food could not be guaranteed in these unregulated situations; therefore, individuals may have been at risk of contracting foodborne illnesses.

"We know someone that is a butcher, and he sells the meat cheap. But he keeps it there [unrefrigerated] for a long time."

Similarly unsafe conditions were described in situations where meat was purchased from vendors who sold meat from their trucks.

"Some guy [comes] around with meat He is selling it right off his truck And they go there because they know it's very cheap. You can

get a big chunk of steak for \$3. That would cost you about \$15 or \$20 in the store. There's no real refrigeration to keep the meat frozen . . . It's just a little portable refrigerator that looks like it could burn out at any time. On a hot summer day, that's not good. He's driving around all day selling meat through the city."

Shop for limited-cost and value foods. Limited-resource clients, according to EFNEP/FSNEP educators, use some cost-cutting strategies to save money while shopping. Food items were purchased in large quantities to receive bulk discounts; in some cases, this food was shared with friends or families. Expensive foods, such as fresh fruits, were avoided in favor of their lower priced canned or frozen counterparts. Inexpensive foods also were used to lower the overall food bill. Examples of these foods included Ramen-style noodles, stews, hamburger, macaroni and cheese, canned foods, bones to make soup, generic or store brands, flour, dry foods, rice, tuna, peanut butter, and pasta. Using coupons was occasionally mentioned as a way of saving money on food purchases. "Almost" expired foods were also purchased. Examples of such purchases were day-old bread, cheese, meat, and produce.

Practices that put individuals at risk in terms of food safety were also used in the quest to obtain low-cost food. Multiple educators reported stories of people purchasing dented cans because the prices were reduced or shopping in stores that specialized in the distribution of such items.

"Actually, all of the supermarkets also have [dented cans] . . . usually in the back of the store . . . Some cans don't even have labels on them."

Stores were also reported as having sold damaged, expired, or improperly refrigerated foods. Additionally, expired foods with reduced prices were sought and purchased by the limited-resource individuals.

Engage in illegal shopping practices. Foods, such as grapes, were eaten while shopping in grocery stores, and a variety of practices were used to take food from the grocery stores and/or supermarkets. EFNEP/FSNEP educators reported that some of their limited-resource clients engaged in the following practices:

"They would shoplift. If they were pregnant, they felt that it was easier to hide the food . . . in their pants."

"They take the bag into the store, whatever store bag that belongs to the store, and they will take it in the store and actually go shopping."

Price tags were also switched on foods; thus, expensive food could be purchased for less money. Leaving restaurants without paying for the meal was mentioned as well.

Discussion

Our findings showed that food acquisition methods of limited-resource individuals had not been fully documented when staff from the New Jersey Expanded Food and Nutrition Education Program (EFNEP) and Food Stamp Nutrition Education Program (FSNEP) anecdotally described novel practices. These stories included purchasing meat that was butchered by a neighbor in a basement and fish that was caught from contaminated waters, bagging perishable leftovers from dinners at community centers and then not

refrigerating them for many hours, and claiming paternity for unrelated children to qualify for public assistance and food stamps. These anecdotes characterized facets of food insecurity that have been minimally addressed within the food security community.

One study limitation that should be recognized is that the data were obtained from a second-hand convenience, nonrandomized sample. Accuracy of responses supplied by the educators has yet to be validated with responses received first hand from limited-resource individuals. However, the nutrition educators had strong relationships with their program participants and were acutely aware of the practices their clients used to maintain food sufficiency. It is uncertain whether limited-resource individuals would feel comfortable sharing their stories with unfamiliar researchers. In fact, because of the fear of possible punitive outcomes, it is possible that individuals would not report questionable practices to researchers. Therefore, we propose that the data gleaned from interviewing nutrition educators are likely more complete than data gathered directly from limited-resource individuals. Nevertheless, the results of this study must be verified with limited-resource individuals.

Extrapolation of the prevalence of each practice into a larger population is not valid. We collected qualitative data. If our results are quantified, serious interpretation errors could result. For example, it is possible that a number of nutrition educators were aware of the same limited-resource individual's unique food acquisition practice. In that case, the quantification of responses could greatly overestimate the prevalence of that particular practice. The determination of the prevalence of these practices is an area for future research to be conducted, in

the form of a survey, directly with limited-resource individuals. Both viable and questionable practices identified in this research confirmed and expanded upon previous findings. The significant findings regarding use of nontraditional sources to acquire food and the sharing of information were documented, and a portion of the basis of a grounded theory concerning the food acquisition practices of limited-resource individuals was formed (Glaser & Strauss, 1967):

- Previously identified coping strategies related to food acquisition were more clearly defined and elaborated.
- New coping strategies related to food acquisition were revealed.
- Emergent findings, conceptualization, and categorization have transpired, yet relationships among emergent findings need to be defined.

This study and others show that people will resort to many, and sometimes drastic and often illegal, means to ensure that they and their families can eat. Begging, earning unreported income, gambling, selling personal possessions, obtaining discarded food, and trying to get sent to jail for ensured access to food were verified previously in the literature (Ahluwalia, 1998; Austin, 1996; Curtis, 1995; Eisinger, 1996; Hamelin, 1999; Herth, 1996; Kendall, 1996; Morton, 1997; Olson, 1997; Petchers, 1989; Pflugh, 1999; Quandt, 2000; U.S. House Select Committee on Hunger, 1990). Engaging in illegal activities has also been determined as a means of earning food money (Petchers, Chow, & Kordisch, 1989). Hamelin, Habicht, and Beaudry (1999) provided a possible rationale for these kinds of activities: "Eventually, the search for food takes precedence over previously held values."

Many practices described in this study were not identified in the scientific literature. The finding that people provide foster care primarily for the purpose of earning extra money for food requires further study to ensure the well-being of children in these cases. Regularly attending events primarily to obtain food—such as church fellowships, nutrition education classes, happy hours, and stores offering samples—did result in obtaining food but is generally considered to be a socially unacceptable practice to acquire food. Private individuals sponsoring food programs, selling surplus food, trading WIC checks for food stamps, establishing store credit, switching price tags on food, and purchasing food from private individuals were also novel findings. Although the practice of searching for or using road-kill for food has not been elucidated in the scientific literature, multiple newspaper stories have reported anecdotal evidence of this practice (Firestone, 1999; Stuever, 1999).

Even under harsh conditions, some people were reportedly able to maintain food sufficiency, while others were not. The ways in which people interacted with their support networks enhanced their abilities to improve food sufficiency in a variety of ways. In fact, many of the practices reported in our study require learning through informal interactions. The sharing of information, an overriding theme in this study, occurred in every category of food acquisition practice identified. People learned from others about the location of assistance programs, ideas for increasing income and saving money, as well as ways to obtain food. Dependence on members in support systems—by asking for or borrowing money, using food stamps, eating with other people, identifying more economical or convenient places to live, and sharing information—has been documented previously in the literature

(Ahluwalia et al., 1998; Curtis & McClellan, 1995; Hamelin et al., 1999; Kendall et al., 1996; Olson et al., 1997; Petchers et al., 1989). One educator stated,

Well, I think I've seen the spectrum of very talented, very skillful individuals . . . who have learned how to navigate the system and use the system to their advantage. And then I've seen those who are ill-informed . . . in terms of how to stretch their dollar . . . or navigate the system. And when I talk about 'navigate the system' we have all kinds of support systems across this country so that no one will go hungry . . . so if you know how to manage, navigate, you can provide for your family.

Although not the focus of this study, pride and embarrassment were mentioned as barriers to obtaining assistance. These obstacles have been documented and elucidated by others (Kendall et al., 1998; Petchers et al., 1989).

Although discount shopping was reported, some educators indicated that many people still shop at nearby, more expensive convenience stores. Food purchased at convenience stores is remarkably more expensive than food from supermarkets and large grocery stores (Mantovani, Daft, Macaluso, & Hoffman, 1997). Despite the conventional wisdom that it is unwise for limited-resource individuals to shop at expensive venues, some people had no other choice because of a lack of transportation. That a lack of transportation translates to limited access to less expensive stores has been confirmed by many studies (Dinkins, 1997; Kendall et al., 1996; Quandt, McDonald, Arcury, Bell, & Vitolins, 2000; Travers, 1996; U.S. House Select Committee on Hunger, 1990).

Many of the food acquisition practices reported in our study involved risks to the individuals who resorted to using them. Food acquisition occurred outside the traditional shopping venues that are closely regulated for food safety (e.g., supermarkets and restaurants), thus placing individuals at risk of foodborne illnesses. Multiple other practices increased food safety risks, as well as risk for nutritional deficiencies, impaired physical well-being, the dangers of arrest, removal from beneficial programs, or the perpetuation of a cycle of financial dependence on credit. In cases where individuals were food insufficient, survival took clear precedence over these risks.

It is plausible that food security indicators currently in common use do not incorporate the issues of food safety and social acceptability, which are parts of the definition for food security. This study's findings lead the authors to suggest the possibility that some people who have learned to function well within their environments would report that they are food sufficient and would be classified as food secure by most indicators. However, these individuals would, in fact, be food insecure because of their use of unsafe or socially unacceptable food acquisition practices such as: seeking out road-kill, fishing from contaminated waters, and acquiring discarded food.

Part of the definition of food security by the Life Sciences Research Office is "to acquire acceptable foods in socially acceptable ways" (Anderson, 1990); this implies food acquisition "without resorting to emergency food supplies, scavenging, stealing and other coping strategies" (Hamelin et al., 1999). Individuals who are apparently food sufficient may be food insecure because the practices they use are unsustainable (cutting on quantity and/or quality of food, buying food on credit)" (Hamelin et al., 1999). Food sufficiency simply

implies an adequate amount of food and does not address whether acceptable food was obtained in a sustainable, socially acceptable manner.

Nonetheless, prior to including these constructs in indicators of food security, research needs to be conducted with the target population to verify these data, to determine the relative risks of engaging in each of the questionable food acquisition practices reported, and to assess the prevalent use of these practices. Use of certain food acquisition practices can indicate a greater degree of food insecurity. For example, shopping economically and using coupons are acceptable, risk-free practices; deliberately committing a crime to be sent to prison to secure a food supply and searching a dumpster for food are not. It would also be helpful to know which food acquisition practices are used regularly by the general population and which are unique to limited-resource individuals, and more specifically, those living in various areas, such as more urban areas.

Nutrition education messages may need to be reviewed in light of these findings. For example, as a result of learning that the purchase of dented cans is a very common practice, the New Jersey EFNEP and FSNEP programs changed the message to limited-resource audiences from "do not buy dented cans" to "buy premium dented cans." Premium dented cans are those that are not bulging, not punctured, and not dented along the primary and secondary seams. In the case of transportation difficulties, it may be more helpful to teach people how to shop economically at convenience stores. Other practical educational topics that may need to be addressed include the safety of nonperishable food and budgeting issues. Broadly accessed programs, such as EFNEP, FSNEP, and WIC are viable mechanisms for information dissemination about food acquisition practices.

... shopping economically and using coupons are acceptable, risk-free practices; deliberately committing a crime to be sent to prison to secure a food supply and searching a dumpster for food are not.

Finally, policy implications and measurement issues may need to be addressed in light of findings that some limited-resource individuals who successfully navigate their environments to maintain food sufficiency may have been assessed as food secure, when in fact they may be food insecure.

When planning educational programs, making policy decisions, and developing policy and program guidelines, educators and policymakers must understand the mindsets and situations of those who will be affected. In this research, it was clear that educators and policymakers whose work involves limited-resource audiences should always keep this in mind:

"[Some] need to eat to survive, so you know whatever foods that are available they're going to eat They're trying just to survive."

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Trends in Food and Nutrient Intakes by Children in the United States

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Monitoring dietary trends can make it easier to target dietary guidance. Trends in intakes among children age 6 to 11 years were examined by using data from the Continuing Survey of Food Intakes by Individuals (CSFII) 1994-96, 1998; the CSFII 1989-91; and the Nationwide Food Consumption Survey 1977-78. Increases were seen in intakes of soft drinks, total grain products, grain mixtures, crackers/popcorn/pretzels/corn chips, fried potatoes, noncitrus juices/nectars, lowfat milk, skim milk, cheese, candy, and fruit drinks/ades. Decreases in intake were observed in whole milk and total milk, yeast breads/rolls, green beans, corn/green peas/lima beans, beef, pork, and eggs. Lower percentages of calories from fat were partly due to increased carbohydrate intakes. Children had decreases in vitamin B₁₂ and increases in thiamin and iron. Servings per day from the food groups of the Food Guide Pyramid were used to discuss diet quality during 1994-96, 1998. For any given Pyramid group, less than one-half of the children consumed the recommended number of servings, and their intakes of discretionary fat and added sugars were much higher than recommended. Guidance should continue to encourage increases in intakes of whole grains, fruits, dark-green and deep-yellow vegetables, legumes, nonfat or lowfat dairy products, and lean meats; decreases in fats and added sugars; and increases in activity. Effective nutrition education efforts for children should be supported at every level.

Dietary guidance in the United States is given in terms of the types and amounts of food people should try to eat in a day (U.S. Department of Agriculture [USDA], 1996). To provide nutrition education messages that help people eat more healthfully, we need to know what people are actually eating, whether food intakes are changing, and, if so, how they are changing. The most recent USDA survey of dietary intakes provides an opportunity to update our knowledge of trends in dietary intakes by children.

To see whether children's food intakes have changed over time, we compared

nationally representative estimates from the most recent USDA survey of dietary intakes with similar estimates from two previous USDA surveys. The three surveys were the Nationwide Food Consumption Survey (NFCs) 1977-78, the Continuing Survey of Food Intakes by Individuals (CSFII) 1989-91, and the CSFII 1994-96, 1998 (Tippett et al., 1995; USDA, 1983; USDA, 1999; USDA, 2000a). The estimates reported in this study are of food intakes, the percentages of individuals consuming foods, and nutrient intakes for girls and boys age 6 to 11 years during all three periods.

Design and Methods

The Three Surveys

The CSFII 1998 was conducted because a larger sample of children under 10 years old was needed for adequate estimation of dietary exposure to pesticide residues (USDA, 2000a, documentation section 2). The CSFII 1998 was designed to be merged with the CSFII 1994-96, and combined data have been released (USDA, 1999; USDA, 2000a). Data collection methods, instruments, and procedures were the same in 1998 as in 1994-96 (Tippett & Cypel, 1998; USDA, 2000a). In each of the 4 years of the CSFII 1994-96, 1998, a nationally representative sample of noninstitutionalized individuals residing in the United States was surveyed. However, the CSFII 1998 sample included only children under 10 years old. The sampling weights developed for the combined 4-year data set permit the 3-year and 1998 samples to be combined statistically and ensure that the combined sample is appropriately representative of the U.S. population.

The CSFII 1994-96, 1998 was the most recent study in the evolving series of USDA food and nutrient intake surveys that also includes the two earlier surveys (Tippett, Enns, & Moshfegh, 2000). Differences among the three surveys in sampling and methodology are discussed briefly in the following paragraphs. More information on methods in the NFCS 1977-78 and the CSFII 1989-91 is available elsewhere (Tippett et al., 1995; USDA, 1983).

The target population covered all 50 States in 1994-96, 1998 versus the 48 conterminous States in 1977-78 and 1989-91. In 1989-91 and 1994-96, 1998, the low-income population was oversampled. In 1977-78 and 1989-91, all children in the sample households were eligible for inclusion in the

survey; in 1994-96, 1998, selected individuals within each household were eligible. The number of children age 6 to 11 and the all-individuals Day-1 response rate, respectively, for each survey are 4,107 and 56.9 percent (NFCS 1977-78); 1,476 and 57.6 percent (CSFII 1989-91); and 2,000 and 81.5 percent (CSFII 1994-96, 1998).

In 1977-78 and 1989-91, dietary data were collected on 3 consecutive days by using a 1-day dietary recall and a 2-day dietary record. In 1994-96, 1998, the number of days was reduced to two, partly to reduce respondent burden (Tippett & Cypel, 1998). Both days of CSFII 1994-96, 1998 dietary data were collected by means of 1-day dietary recalls; interviews were on nonconsecutive days, 3 to 10 days apart, to ensure that nutrient intakes on the 2 days would be statistically uncorrelated.

Between the earlier surveys and the CSFII 1994-96, 1998, the 1-day recall was modified to include multiple passes through the list of all foods and beverages recalled by the respondent (Tippett & Cypel, 1998). In 1977-78 and 1989-91, an adult household member reported intake information for children under 12 years old (Tippett et al., 1995; USDA, 1983). In 1994-96, 1998, children 6 to 11 years old were asked to describe their own food intake and were assisted by an adult household member. When necessary, additional information was obtained from school cafeteria personnel or baby-sitters. All these measures were designed to improve the completeness of the data collected.

The USDA Survey Nutrient Database was updated on an ongoing basis to incorporate additional nutrients and improved nutrient values as well as to reflect changes in foods on the market (Tippett & Cypel, 1998; Tippett et al., 1995; USDA, 1987; USDA, 1993).

Presentation of Estimates

Because the number of survey days and the method of data collection on Day 2 differed among the surveys, tables comparing food and nutrient intake estimates among the surveys are based on only the first day's data collected from each individual. Using these data maximizes comparability among surveys. One-day data are appropriate for comparisons of group means. All estimates are weighted to be nationally representative.

Mean food intakes are presented "per individual," meaning they include intakes by both consumers and non-consumers of the food group. To calculate "per user" intakes of foods, researchers may divide the mean intake of a food group by the percentage of individuals using that food group, expressed as a decimal. Because only selected food subgroups are presented, subgroup intakes will not sum to the food group total.¹ Food mixtures were not broken down; mixed foods reported by respondents were grouped by their main ingredient.² One effect of this method of classifying foods is the inflation of some food groups or subgroups (e.g., meat mixtures) and deflation of others (e.g., sugars and sweets) relative to the amounts they would contain if all ingredients were disaggregated.

Estimates based on a small number of observations or on highly variable data may tend to be less statistically reliable than estimates based on larger sample sizes or on less variable data. Standard errors may be used to calculate a measure of the relative variability of

¹Readers interested in subgroups not included here are directed to Tippett et al., 1995; USDA, 1983; and USDA, 1999.

²See "Table Notes" in Tippett et al., 1995, and USDA, 1983; see "Descriptions of Food Groups" in USDA, 1999.

In 1977-78 children drank about four times as much fluid milk as any other beverage; by 1994-96, 1998 they drank only about 1.5 times as much milk as soft drinks.

an estimate called the coefficient of variation, the ratio of the standard error to the estimate itself. Because the CSFII has a complex sample design, sampling weights and specialized standard error estimation procedures were used in computing the estimates and standard errors (USDA, 2000a, documentation section 5). SAS version 8.2 (1999) and SUDAAN version 7.5.1 (Shah, Barnwell, & Bieler, 1997) were used for statistical calculations.

In the tables, we flagged estimates that are potentially less reliable because of factors such as small sample sizes or large coefficients of variation. The guidelines that were used for determining when a statistic may be less reliable involve the use of a variance inflation factor in the role of a broadly calculated design effect; those guidelines have been described in detail elsewhere (USDA, 1999, appendix B). The variance inflation factors used in this study are 1.19 (1977-78), 2.26 (1989-91), and 2.24 (1994-96, 1998).

Approximate *t*-tests were performed to determine whether food and nutrient intakes and the percentages of individuals using foods were significantly higher or lower in 1977-78 versus 1989-91; 1989-91 versus 1994-96, 1998; and 1977-78 versus 1994-96, 1998. All told, 460 pairs of estimates were compared. Because the analysis involved such a large number of comparisons, we used conservative criteria for significance. When significant differences are discussed in the text, they may be referred to either as "changes" (or values may be said to have risen/fallen or to be higher/lower in 1994-96, 1998 than in 1977-78) or as "trends."

The term "change" is used only if intakes (or percentages using) in 1977-78 and 1994-96, 1998 were different when *p* was less than 0.001. The term "trend" is used only if two criteria were

met: (1) mean intakes (or percentages using) either rose or fell progressively from one survey to the next (e.g., intake *X* rose between 1977-78 and 1989-91, then rose again between 1989-91 and 1994-96, 1998), and (2) *p* was less than 0.05 for both comparisons. For each trend, the level of significance noted in the tables (< 0.05 or < 0.01) is the one that is true of both the 1977-78 versus 1989-91 *t*-test and the 1989-91 versus 1994-96, 1998 *t*-test. For example, if the 1977-78 versus 1989-91 *t*-test was significant at $p < 0.01$ but the 1989-91 versus 1994-96, 1998 *t*-test was significant at $p < 0.05$, the latter level is shown in the table.

Results and Discussion

Beverages

In the past 20 years, the overall picture of beverage intakes by children has changed considerably. There was a decreasing trend in intake of total fluid milk—driven by a reduction in the intake of whole milk—for girls age 6 to 11 and a parallel change for boys the same age; an increasing trend in intakes of soft drinks was seen for both girls and boys (tables 1 and 2). In 1977-78 children drank about four times as much fluid milk as any other beverage; by 1994-96, 1998 they drank only about 1.5 times as much milk as soft drinks. Other beverages also contributed to the shift to a lesser degree. Both intakes and percentages of children using beverages from the groups "noncitrus juices and nectars" and "fruit drinks and ades" were higher in 1994-96, 1998 than in 1977-78 (tables 1 through 4).

The shift in beverage intakes is of nutritional concern. Guenther (1986) found negative associations between intake of soft drinks and intakes of milk, calcium, magnesium, riboflavin, vitamin A, and vitamin C. Harnack,

Stang, and Story (1999) reported a positive association between consumption of nondiet soft drinks and energy intake in an analysis of CSFII 1994 data. Wyshak (2000) found that high-school-age girls who drink carbonated beverages may have a higher risk of bone fractures than do girls who do not drink carbonated beverages. In a 19-month-long prospective study, Ludwig, Peterson, and Gortmaker (2001) observed an association between consumption of sugar-sweetened drinks and childhood obesity. Because the studies by Guenther (1986), Harnack et al. (1999), Wyshak (2000), and Ludwig et al. (2001) were observational, it cannot be inferred that the relationships between soft drinks and the negative outcomes described were causal. Further research is needed in this area.

Foods

Overall, the intakes of grain products were one-fifth to one-third higher in 1994-96, 1998 than in 1977-78 for girls and boys age 6 to 11 (tables 1 and 2). In all three surveys, the subgroup "mixtures mainly grain"—grain-based mixtures such as pasta with sauce, rice dishes, and pizza—accounted for the largest share (by weight) of grain products eaten by children. Intakes of the grain mixtures subgroup and the percentages of children using grain mixtures increased between 1977-78 and 1994-96, 1998 (tables 3 and 4).

Increasing trends were observed in children's intakes of grain-based snack foods from the group "crackers, popcorn, pretzels, and corn chips." A trend toward higher intakes of ready-to-eat cereals was also evident for boys. Both intakes and percentages of individuals using yeast breads and rolls were lower for girls and boys in 1994-96, 1998 than in 1977-78 but did not meet the definition of a trend. Yeast breads and rolls are common components in sandwiches, and some sandwiches (especially fast-food items) are

Table 1. Trends and changes in girls' (6 to 11 years) mean intakes from selected food groups

Food group	Intake (grams)			Change ¹	Trend ²
	1977-78	1989-91	1994-96, 1998		
Grain products	230	268	280	+50	
Yeast breads and rolls	51	46	43	-8	
Ready-to-eat cereals	18	21	20		
Cakes, cookies, pastries, pies	34	33	42		
Crackers, popcorn, pretzels, corn chips	5	9	14	+9	**
Mixtures mainly grain	63	93	101	+38	
Vegetables	159	128	116	-42	
White potatoes	56	55	46		
Fried white potatoes	17	26	25	+9	
Dark-green vegetables	7	4	5		
Deep-yellow vegetables	7	7 ¹	4		
Tomatoes	14	14	15		
Green beans	10	7	5	-5	
Corn, green peas, lima beans	22	16	12	-10	
Fruits	159	194	169		
Citrus juices	60	55	54		
Apples	27	32	21		
Melons and berries	7	6 ¹	8		
Noncitrus juices and nectars	14	44	42	+28	
Milk and milk products	492	430	382	-110	*
Fluid milk	417	339	283	-133	**
Whole milk	244	171	108	-136	**
Lowfat milk	64	146	136	+72	
Skim milk	14	15	29		
Milk desserts	28	31	3		
Cheese	8	12	14	+6	
Meat, poultry, and fish	157	141	130	-28	
Beef	40	18	18	-22	
Pork	13	9	5	-8	*
Frankfurters, sausages, luncheon meats	17	20	19		
Chicken	18	17	17		
Fish and shellfish	6	9 ¹	5		
Mixtures mainly meat, poultry, fish	55	63	60		
Eggs	16	15	11	-5	
Legumes	20	21	12		
Fats and oils	9	9	7		
Sugars and sweets	28	41	41	+13	
Candy	5	8	12	+7	
Beverages	250	264	370	+120	
Tea	51	40	34		
Fruit drinks and ades	91	86	134	+43	
Carbonated soft drinks	106	136	200	+94	*

¹Change = mean intakes in 1977-78 and 1994-96, 1998 are significantly different at $p < 0.001$.

²Trend = mean intake rose or fell progressively from 1977-78 through 1989-91 to 1994-96, 1998.

³Estimate is based on small sample size or coefficient of variation ≥ 30 percent.

* = trend significant at $p < 0.05$.

** = trend significant at $p < 0.01$.

In 1994-96, 1998, only 24 percent of girls and 23 percent of boys consumed the number of servings of fruit recommended in the Food Guide Pyramid based on their caloric intake.

Table 2. Trends and changes in boys' (6 to 11 years) mean intakes from selected food groups

Food group	Intake (grams)			Change ¹	Trend ²
	1977-78	1989-91	1994-96, 1998		
Grain products	244	296	318	+74	
Yeast breads and rolls	57	47	46	-11	
Ready-to-eat cereals	20	24	31	+11	*
Cakes, cookies, pastries, pies	40	37	40		
Crackers, popcorn, pretzels, corn chips	5	9	15	+11	*
Mixtures mainly grain	61	108	115	+53	
Vegetables	154	130	115	-39	
White potatoes	61	57	50		
Fried white potatoes	18	26	27	+8	
Dark-green vegetables	6	5	5		
Deep-yellow vegetables	7	4	5		
Tomatoes	11	12	16		
Green beans	8	7	5	-4	
Corn, green peas, lima beans	23	14	11	-11	
Fruits	152	173	183		
Citrus juices	55	55	60		
Apples	23	29	28		
Melons and berries	9	5	16		
Noncitrus juices and nectars	15	37	40	+25	
Milk and milk products	527	459	450	-77	
Fluid milk	447	374	335	-112	
Whole milk	256	155	121	-135	
Lowfat milk	70	193	172	+102	
Skim milk	15	15	33		
Milk desserts	30	24	35		
Cheese	7	10	12	+5	
Meat, poultry, and fish	172	145	154		
Beef	39	18	19	-21	
Pork	15	11	7	-8	
Frankfurters, sausages, luncheon meats	19	18	24		
Chicken	21	18	20		
Fish and shellfish	6	10	6		
Mixtures mainly meat, poultry, fish	60	64	72		
Eggs	19	15	12	-6	
Legumes	22	13	13		
Fats and oils	10	9	7		
Sugars and sweets	30	28	42	+13	
Candy	5	9	12	+8	
Beverages	264	329	413	+149	**
Tea	50	44	39		
Fruit drinks and ades	99	114	155	+56	
Carbonated soft drinks	112	169	217	+105	*

¹Change = mean intakes in 1977-78 and 1994-96, 1998 are significantly different at $p < 0.001$.

²Trend = mean intake rose or fell progressively from 1977-78 through 1989-91 to 1994-96, 1998.

* = trend significant at $p < 0.05$.

** = trend significant at $p < 0.01$.

categorized under “mixtures mainly meat, poultry, fish”; intake estimates for yeast breads and rolls would be higher if the breads and rolls from those sandwiches were included here.

In 1994-96, 1998, only 39 percent of girls and 47 percent of boys consumed the number of servings of grain products recommended in the Food Guide Pyramid based on their caloric intake (USDA, 2000b). Despite Pyramid recommendations to choose “several servings a day” of whole-grain foods (USDA, 1996), intake of whole grains by children in 1994-96, 1998 was only 1 serving per day or less.

Children’s intakes from the category “total vegetables” were lower in 1994-96, 1998 than in 1977-78. It is important to remember that vegetables are frequently consumed as part of meat mixtures and grain mixtures; in intakes by adults in the CSFII 1994, vegetables accounted for about 24 and 28 percent (by weight) of grain mixtures and meat mixtures, respectively (Enns, Goldman, & Cook, 1997). If vegetables account for a similar proportion of grain and meat mixtures for children as for adults, then the observed higher intakes of grain mixtures would at least partially offset the lower intakes of vegetables. Further research is needed to clarify this issue. However, even when mixture ingredients are separated into their respective groups, at least 80 percent of children had diets that did not meet the Pyramid recommendations for servings of vegetables (USDA, 2000b).

Despite Pyramid recommendations to eat both dark-green leafy vegetables and legumes “several times a week,” children ate only one-tenth of a serving from either category on any given day. Children’s intakes of fried white potatoes were higher in 1994-96, 1998 than in 1977-78, and the percentages of children using tomatoes rose between 1977-78 and 1994-96, 1998. Children

Table 3. Trends and changes in girls’ (6 to 11 years) percentages using items from selected food groups

Food group	Percentage using				Change ¹	Trend ²
	1977-78	1989-91	1994-96	1998		
Grain products	99	100 ^{1,3}	99 ⁷			
Yeast breads and rolls	79	73	71		-8	
Ready-to-eat cereals	51	48	46			
Cakes, cookies, pastries, pies	51	45	55			
Crackers, popcorn, pretzels, corn chips	18	22	37		+19	
Mixtures mainly grain	29	40	46		+17	
Vegetables	87	81	82			
White potatoes	54	51	51			
Fried white potatoes	30	37	39		+9	
Dark-green vegetables	7	7	5			
Deep-yellow vegetables	9	10	11			
Tomatoes	21	27	33		+12	
Green beans	14	8	8		-6	
Corn, green peas, lima beans	24	17	15		-9	
Fruits	62	67	62			
Citrus juices	31	24	22		-9	
Apples	18	21	16			
Melons and berries	4	3	7			
Noncitrus juices and nectars	6	16	15		+9	
Milk and milk products	95	93	90		-5	
Fluid milk	90	82	76		-14	*
Whole milk	58	44	33		-25	**
Lowfat milk	17	39	38		+21	
Skim milk	4	5	8		+5	
Milk desserts	24	21	22			
Cheese	17	28	32		+14	
Meat, poultry, and fish	94	90	86		-7	
Beef	35	22	20		-15	
Pork	20	15	10		-10	*
Frankfurters, sausages, luncheon meats	32	34	33			
Chicken	16	18	20			
Fish and shellfish	8	7	6			
Mixtures mainly meat, poultry, fish	31	36	33			
Eggs	22	21	13		-8	
Legumes	13	15	11			
Fats and oils	54	56	49			
Sugars and sweets	56	55	60			
Candy	11	16	29		+18	*
Beverages	60	60	73		+12	
Tea	16	11	11			
Fruit drinks and ades	27	25	36		+9	
Carbonated soft drinks	30	37	45		+14	*

¹Change = percentages in 1977-78 and 1994-96, 1998 are significantly different at $p < 0.001$.

²Trend = percentage rose or fell progressively from 1977-78 through 1989-91 to 1994-96, 1998.

³Estimate is based on small sample size or coefficient of variation ≥ 30 percent.

⁴Value is between 99.5 and 100.

* = trend significant at $p < 0.05$.

** = trend significant at $p < 0.01$.

had both lower intakes and lower percentages using the subgroups "green beans" and "corn, green peas, lima beans" in 1994-96, 1998, compared with 1977-78.

Aside from the observed changes in intakes of noncitrus juices and nectars, few changes occurred in fruit consumption: Between 1977-78 and 1994-96, 1998, the percentage using citrus juices fell among girls. In 1994-96, 1998, only 24 percent of girls and 23 percent of boys consumed the number of servings of fruit recommended in the Food Guide Pyramid based on their caloric intake (USDA, 2000b).

Among milk and milk products subgroups, children's intakes of some high-fat items (e.g., whole milk) decreased and others (e.g., cheese) increased. Notably, milk intakes shifted away from whole milk.³ Decreasing trends were seen in girls' intakes of whole milk and in the percentages of both girls and boys using whole milk. Intakes of lower fat milks (2-percent, 1-percent, and skim) surpassed those of whole milk in 1989-91 for boys and in 1994-96, 1998 for girls. Although the percentages of children drinking skim milk more than doubled between 1977-78 and 1994-96, 1998, they still remained low (8 to 9 percent), as did their intakes of skim milk (29 to 33 g, or about 1 fluid ounce). None of the shifts in intakes of lower fat milks or percentages using them qualified as a trend.

³Another shift occurred that can be seen by summing the milk subgroup intakes (whole, lowfat, and skim) in a given survey and dividing by the intake of total fluid milk. A greater proportion of total fluid milk was allocated to a specific fat level in later years than in 1977-78. The increase may indicate a greater awareness of the fat level of milk, since the ability to classify fluid milk as whole, lowfat, or skim depends on information provided by respondents. Milk whose fat level was not specified was included under total fluid milk but not in any of the subgroups.

Table 4. Trends and changes in boys' (6 to 11 years) percentages using items from selected food groups

Food group	Percentage using			Change ¹	Trend ²
	1977-78	1989-91	1994-96, 1998		
Grain products	100 ⁺ 3	100 ⁺ 3	99 ³		
Yeast breads and rolls	81	68	69	-12	
Ready-to-eat cereals	52	51	52		
Cakes, cookies, pastries, pies	52	39	52		
Crackers, popcorn, pretzels, corn chips	16	22	34	+18	
Mixtures mainly grain	26	46	45	+19	
Vegetables	85	80	79		
White potatoes	56	46	49		
Fried white potatoes	31	31	38		
Dark-green vegetables	5	5	6		
Deep-yellow vegetables	10	8	12		
Tomatoes	18	28	39	+21	**
Green beans	13	10	7	-6	
Corn, green peas, lima beans	24	16	14	-10	
Fruits	59	63	57		
Citrus juices	28	22	22		
Apples	16	19	18		
Melons and berries	4	5	7		
Noncitrus juices and nectars	7	12	13	+6	
Milk and milk products	94	90	92		
Fluid milk	90	79	79	-10	
Whole milk	58	40	31	-27	*
Lowfat milk	17	41	43	+26	
Skim milk	3	5	9	+6	
Milk desserts	22	18	25		
Cheese	15	25	32	+17	**
Meat, poultry, and fish	95	88	88	-7	
Beef	33	18	22	-11	
Pork	22	15	12	-10	
Frankfurters, sausages, luncheon meats	33	30	36		
Chicken	17	18	20		
Fish and shellfish	7	9	5		
Mixtures mainly meat, poultry, fish	31	35	36		
Eggs	23	20	16	-8	
Legumes	14	9	10		
Fats and oils	55	46	47		
Sugars and sweets	56	49	60		
Candy	9	16	29	+20	**
Beverages	62	64	74	+12	
Tea	15	11	9		
Fruit drinks and ades	27	27	39	+12	
Carbonated soft drinks	31	38	47	+16	

¹Change = percentages in 1977-78 and 1994-96, 1998 are significantly different at $p < 0.001$.

²Trend = percentage rose or fell progressively from 1977-78 through 1989-91 to 1994-96, 1998.

³Estimate is based on small sample size or coefficient of variation ≥ 30 percent.

⁴Value is between 99.5 and 100.

* = trend significant at $p < 0.05$.

** = trend significant at $p < 0.01$.

On the other hand, an increasing trend in the percentage using cheese was seen for boys, while the increase for girls did not meet the definition of a trend. Cheese intakes were higher in 1994-96, 1998 than in 1977-78 for both girls and boys. Because cheese is a common component in both grain and meat mixtures, estimates for cheese would be even higher if the cheese that was an ingredient in these mixtures was included here. In 1994-96, 1998, only 29 percent of girls and 40 percent of boys consumed the number of servings of dairy products recommended in the Food Guide Pyramid based on their age (USDA, 2000b).

The percentages of children using foods from the meat, poultry, and fish group were lower in 1994-96, 1998 than in 1977-78. Both intakes and percentages of individuals using beef and pork separately (i.e., not as part of a mixture) fell. In all three surveys, intakes of "mixtures mainly meat, poultry, fish"—such as beef stew, hamburgers, chicken pot pie, and tuna salad—accounted for the largest share of intakes of total meat, poultry, and fish. Intakes and percentages of individuals eating eggs were lower in 1994-96, 1998 than in 1977-78 for both boys and girls.

In 1994-96, 1998, only 12 percent of girls and 21 percent of boys consumed the number of servings of meat and meat alternates recommended in the Food Guide Pyramid based on their caloric intake (USDA, 2000b). It is noteworthy that cooked dry beans (other than soybeans) and peas, which may be tabulated under either the vegetable group or the meat group, were tabulated under the meat group for that analysis; otherwise, the percentages consuming the recommended number of servings from the meat group would have been even lower.

Percentages using candy exhibited upward trends for both girls and boys. Children's candy intakes were higher in 1994-96, 1998 than in 1977-78. Fats, oils, and sugars are common ingredients in foods; thus, estimates of intakes and percentages using fats, oils, and sugars would be higher if the amounts that were ingredients in other foods were included here.

In 1994-96, 1998, intakes of discretionary fat and added sugars⁴—items from the tip of the Pyramid—were much higher than recommended (USDA, 2000b). At that time, discretionary fat intake accounted for about 25 percent of calories for girls and boys age 6 to 11. In a diet that meets all other Pyramid recommendations, discretionary fat intake would be expected to be closer to 15 percent of calories (USDA, 1996). In 1994-96, 1998, children age 6 to 11 consumed 21 to 23 teaspoons of added sugars in a diet providing around 1,800 to 2,000 calories. The Pyramid suggests that Americans try to limit their added sugars to 6 teaspoons a day if they eat about 1,600 calories, 12 teaspoons at 2,200 calories, or 18 teaspoons at 2,800 calories (USDA, 1996).

Energy Out of Balance

Over roughly the same period covered by the present analysis, the percentages of 6- to 11-year-olds in the United States who were overweight⁵ nearly doubled—from 7 to 8 percent in 1976-80 to 13 to 15 percent in 1988-94 (U.S. Department of Health and Human Services [DHHS], 2000). The increasing prevalence of overweight is of

concern for many reasons, including the increasing incidence and prevalence of Type II diabetes mellitus among overweight and obese children (American Diabetes Association, 2000).

In the face of increasing overweight, one would expect to see either increasing energy intake, decreasing energy expenditure, or both. In the present analysis, no significant trends or changes were seen in energy intakes between 1977-78 and 1994-96, 1998 (table 5). Energy intake stayed about the same for girls and dipped in 1989-91 for boys.

Findings of underreporting in surveys, which are often but not always higher among overweight respondents, might lead one to speculate that the lack of a trend in energy intake could be due to increased underreporting over time as a function of increased obesity. On the other hand, methodological improvements in the Agricultural Research Service's 24-hour recall have addressed several issues that are considered important in obtaining complete intake data (see "Design and Methods"). Using CSFII data, Krebs-Smith et al. (2000) identified low energy reporters by first estimating basal metabolic rate (BMR)⁶ based on self-reported body weight, sex, and age and then comparing the BMR estimates with a cutoff level.⁷ They found that the percentage of adults who were low energy reporters was lower in 1994-96 (15 percent) than in 1989-91 (25 percent). They also found less underreporting among children than among adults: Only 7.8 percent of children age 2 to 11 in the CSFII 1994-96 were found to be low

⁴For definitions of discretionary fat and added sugars, see appendix D in Pyramid Servings table set 1 (USDA, 2000b).

⁵Overweight is defined as body mass index (BMI) at or above the sex- and age-specific 95th percentile BMI cutoff points from the revised CDC Growth Charts: United States (Kuczmarski et al., 2000).

⁶BMR was estimated by using the formula developed by Schofield (1985).

⁷Eighty percent of BMR was the cutoff level used. That level was proposed by Goldberg et al. (1991) as the lower limit of plausible energy intake for a single individual with 2 days of intake data and 99.7 percent confidence limits.

energy reporters (S.M. Krebs-Smith, personal communication, March 8, 2002). Livingstone and Robson (2000) have stated that determining whether a child's energy intake is implausibly low should take into account detailed information on the child's activity level; however, such information is not available from the three surveys in the present analysis.

Inactivity is probably a strong factor in the increased prevalence of overweight in the United States (Weinsier, Hunter, Heini, Goran, & Sell, 1998). On any given day in 1994-96, 1998, 27 percent of girls and 32 percent of boys age 6 to 11 watched 4 or more hours of television or videos; 38 percent of girls and 40 percent of boys watched 2 to 3 hours; 35 percent of girls and 29 percent of boys watched 1 hour or less (unpublished data). For children, accumulating at least 60 minutes of moderate physical activity on most or all days of the week has been identified as a goal to promote better long-term health (DHHS, 2001; USDA & DHHS, 2000).

Energy-Providing Nutrients (Macronutrients)

A trend toward higher carbohydrate intakes was evident among boys age 6 to 11. For girls, carbohydrate intake was 38 g per day higher in 1994-96, 1998 than in 1977-78, although the *p*-value criterion for a trend was not met. For both girls and boys, protein and fat intakes were lower in 1994-96, 1998 than in 1977-78.

These shifts in macronutrient intakes between 1977-78 and 1994-96, 1998 were reflected in trends toward a lower proportion of food-energy intake from fat and a higher proportion from carbohydrate. Children's percentage of calories from protein was also lower in 1994-96, 1998 than in 1977-78, but the decrease only reached trend status for boys. The proportion of energy from fat

in children's diets in 1994-96, 1998 (33 percent) was still higher than that recommended by the Dietary Guidelines for Americans: 30 percent of calories or less (USDA & DHHS, 2000). At 12 percent of calories, saturated fat intakes still exceeded the recommendation of less than 10 percent of calories.

Although the shifts in the proportion of energy intake from fat and carbohydrate appear to have brought the macronutrient proportions in the average diet closer to the recommended levels, a closer examination is less encouraging. The observed decrease in the percentage of calories from fat is more due to the increase in calories from carbohydrate than to the decrease in fat intake. Fat intake decreased by about 100 kcal or less, but carbohydrate intake increased by about 150 to 200 kcal, based on estimates in table 5 multiplied by Merrill and Watt's (1973) general conversion factors of 9 kcal/g for fat and 4 kcal/g for carbohydrate.

Vitamins, Minerals, and Other Dietary Components

For girls age 6 to 11, the only trend in vitamin or mineral intakes was a decrease in intake of vitamin B₁₂; changes included higher intakes of thiamin and iron in 1994-96, 1998 than in 1977-78 (table 5). For boys, there were increasing trends in intakes of thiamin and iron; additional changes included higher intakes of vitamin C, riboflavin, niacin, and vitamin B₆ and a lower intake of vitamin B₁₂.

Mean dietary fiber intakes in 1994-96, 1998 were 12 g for girls and 14 g for boys (unpublished data). One current recommendation suggests that fiber intakes for children should equal "age plus 5 grams per day" (Williams, Bollella, & Wynder, 1995) (e.g., 13 g fiber for an 8-year-old). Observed increases in carbohydrate intakes were paralleled neither by significant

increases in dietary fiber intakes nor by increases in overall intakes of fiber-rich foods.

Summary and Recommendations

A French proverb states, "The more things change, the more they remain the same." The survey data used in preparing this article span nearly a quarter of a century. Those who were 6 to 11 years old in 1977-78 at the time of the first survey used in this study were 22 to 32 years old in 1994-96, 1998—old enough to be the parents of the children in the third survey used here. Although children's food intakes have changed in various ways over time, the list of improvements that are still needed has remained nearly identical.

Children's diets exhibited trends toward large increases in intakes of soft drinks as well as decreases in intakes of total fluid milk that were driven by decreases in whole milk. Some other shifts were to higher intakes of grain products (especially grain mixtures), crackers/popcorn/pretzels/corn chips, fried potatoes, noncitrus juices/nectars, lowfat milk, skim milk, cheese, candy, and fruit drinks/ades. Other shifts were to lower intakes of yeast breads/rolls, green beans, corn/green peas/lima beans, beef, pork, and eggs.

Despite those shifts in intakes, most of the take-home messages about how to improve children's diets remain the same:

- Eat more whole grains.
- Eat more vegetables, especially dark-green and deep-yellow vegetables.
- Eat more fruits—both citrus and noncitrus, with an emphasis on whole fruits rather than juices.
- Eat more legumes.

Table 5. Trends and changes in girls' and boys' (6 to 11 years) mean intakes of food energy and selected nutrients and mean percentages of calories from protein, fat, and carbohydrate

Food group	Intake			Change ¹	Trend ²
	1977-78	1989-91	1994-96, 1998		
	Girls				
	n=2,101	n=722	n=969		
Energy (kcal)	1,806	1,832	1,825		
Protein (g)	69.3	67.2	62.7	-6.6	
Fat (g)	77.8	69.8	66.8	-11.0	
Carbohydrate (g)	211.9	241.6	250.0	+38.1	
Protein (% kcal)	15.5	15.1	13.9	-1.6	*
Fat (% kcal)	38.2	33.8	32.6	-5.6	*
Carbohydrate (% kcal)	47.4	52.6	54.9	+7.6	**
Vitamin A (IU)	4,822	5,225	4,475		
Vitamin C (mg)	86	90	95		
Thiamin (mg)	1.32	1.53	1.48	+0.16	
Riboflavin (mg)	1.93	2.00	1.91		
Niacin (mg)	16.7	18.6	18.1		
Vitamin B ₆ (mg)	1.46	1.58	1.52		
Vitamin B ₁₂ (μg)	5.36	4.34	3.87	-1.49	*
Calcium (mg)	906	916	865		
Phosphorus (mg)	1,184	1,215	1,138		
Magnesium (mg)	230	230	219		
Iron (mg)	10.7	13.0	13.8	+3.1	
	Boys				
	n=2,006	n=754	n=1,031		
Energy (kcal)	1,950	1,891	2,050		
Protein (g)	75.6	70.1	71.2	-4.4	
Fat (g)	84.7	72.7	75.1	-9.6	
Carbohydrate (g)	226.2	245.5	279.6	+53.3	**
Protein (% kcal)	15.7	15.0	14.0	-1.6	*
Fat (% kcal)	38.5	34.2	32.6	-6.0	**
Carbohydrate (% kcal)	46.8	52.0	54.8	+8.0	**
Vitamin A (IU)	5,056	4,902	5,242		
Vitamin C (mg)	87	98	103	+16.0	
Thiamin (mg)	1.46	1.59	1.77	+0.31	*
Riboflavin (mg)	2.11	2.11	2.28	+0.17	
Niacin (mg)	18.4	19.4	21.5	+3.1	
Vitamin B ₆ (mg)	1.59	1.62	1.84	+0.26	
Vitamin B ₁₂ (μg)	5.88	4.42	4.53	-1.35	
Calcium (mg)	967	978	984		
Phosphorus (mg)	1,278	1,261	1,292		
Magnesium (mg)	244	233	249		
Iron (mg)	11.5	13.7	16.6	+5.1	**

¹Change = mean intakes (or percentages) in 1977-78 and 1994-96, 1998 are significantly different at $p < 0.001$.

²Trend = mean intake (or percentage) rose or fell progressively from 1977-78 through 1989-91 to 1994-96, 1998.

* = trend significant at $p < 0.05$.

** = trend significant at $p < 0.01$.

- Shift to lean meats and meat alternates.
- Drink more skim or 1-percent milk, or eat more lowfat dairy products, or include plenty of nondairy sources of calcium.
- Decrease the amount of fat used in cooking.

The amount of discretionary fat and added sugars in children's diets is much higher than is recommended by the Food Guide Pyramid. Children's diets would benefit overall from lowering intakes of "empty-calorie" foods and beverages that are high in fats and sugars but provide few other nutrients. In addition, when choosing among more nutrient-dense foods, children would do well to shift toward items lower in fat and sugar. Increases in intakes of foods high in fiber and complex carbohydrates—such as whole grains, vegetables, fruits other than fruit juices, and legumes—could lead to a diet lower in fat and added sugars and higher in fiber and complex carbohydrates. If such a change led to a lower overall energy intake, weight maintenance or loss would be made easier. Because widespread inactivity has been identified as a factor in the national epidemic of overweight, increased activity should be encouraged.

Nutrition education can successfully change dietary behavior among elementary school-aged children, and factors leading to the effectiveness of nutrition education have been identified (Contento et al., 1995). Resources must be committed on every level—national, State, local, community, school, and family—to help children eat more healthfully and become more active.

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Trends in Children's Consumption of Beverages: 1987 to 1998

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Beverages contribute to the overall quality of children's dietary intake. This study examined trends in beverage consumption for children age 1 to 19 years for three 2-year periods between 1987 and 1998. Intakes were collected from a nationally representative sample of households. A 2-week diary by the National Family Opinion Research/Beverage Unit's Share of Intake Panel during 1987-88, 1992-93, and 1997-98 was used to collect these intakes. During these periods, the consumption of carbonated soft drinks decreased significantly for children age 1 to 5 years—83.5, 78.2, and 72.1 percent, respectively, whereas consumption of milk remained stable for all groups, and consumption of lowfat milk became more prevalent than consumption of whole milk. The quantity of milk consumed increased for children age 1 to 5 years (11.6 to 13.5 oz/day), while the quantity of carbonated soft drinks consumed decreased (5.2 to 3.7 oz/day). The quantity of fruit drinks increased for all age groups. This study is useful to those who are developing strategies to improve the overall quality of children's diets. Further research is needed to investigate the effect children's beverage consumption has on their health and to evaluate the effect of beverage consumption on total dietary intake.

Children consume fewer meals at the dining table and more meals and snacks away from home. Only 36 percent of respondents to a recent study on eating habits reported that they ate together as a family five or more nights a week (Anonymous, 2000). For teenagers, 5 percent of out-of-home eating occasions consisted of a trip to a convenience store—most often for a beverage purchased from a vending machine (Anonymous, 1999b). Throughout the day, children consume a variety of beverages, which often include milk, juice, fruit drinks, carbonated soft drinks, powdered soft drinks, and water.

To implement strategies to improve the health of children, the nutrition community needs to understand the effect of beverage consumption on nutrition, in terms of the frequency and quantity of each beverage consumed, as well as the relationship of beverages

to food consumption and health. However, it is somewhat difficult to determine the contribution of each beverage to the overall diet, especially children's diets.

Efforts to promote milk consumption have increased, and their effects on health and nutrition have yet to be understood fully. Calcium intake is low for adolescent girls, a particular concern because calcium absorption is at its highest during adolescence (Amschler, 1999). When calcium intake is inadequate early in life, the risk of osteoporosis increases (National Institutes of Health [NIH], 1994). Some studies have reported that consumption of carbonated soft drinks has increased; this may have a significant effect on nutrition (Borrud, Enns, & Mickel, 1997).

Research suggests that caffeine, which is more frequently found in cola

beverages than in other soft drinks, may reduce calcium retention (Weaver, Proulx, & Heaney, 1999). Also, the phosphoric acid in carbonated beverages (cola and others) interferes with the metabolism of calcium (Calvo, 1994; Wyshak, 2000; Wyshak & Frisch, 1994). Other researchers, however, disagreed with these findings (The Pediatric Forum, 2001). Heaney and Rafferty (2001) concluded that the net effect of caffeine on calcium economy was negligible.

Finally, no conclusive evidence has indicated that carbonated soft drinks are the "cause" of low intakes of other beverages or that they are displacing other beverages in the diet, although some studies indicate a very suggestive relationship between higher quantities of carbonated soft drinks and lower quantities of milk consumption (Bowman, 1999; Harnack, Stang, & Story, 1999).

The debate over the consumption of fruit juice remains, having been argued to have effects on children's health that are both favorable (Doucette & Dwyer, 2000; Skinner & Carruth, 2001) and unfavorable (Dennison, Rockwell, & Baker, 1997; Tanasescu, Ferris, Himmelgreen, Rodriguez, & Perez-Escamilla, 2000). Regardless, 100-percent fruit juice is an excellent source of many essential vitamins and minerals and is consumed by a significant number of U.S. children (Ballew, Kuester, & Gillespie, 2000).

In recent years, fruit drinks—often made with only 5 to 10 percent fruit juice—have emerged as a growing component of the American diet. In 1997, sales of fruit drinks surpassed sales of 100-percent fruit juices (Sfiligoj, 1998). Fruit drinks, despite their higher sugar content, compared with fruit juices, provide about 17 percent of vitamin C for children age 2 to 5 and are the second greatest source

of vitamin C for children of all ages (Subar, Krebs-Smith, Cook, & Kahle, 1998). Although fruit drinks could contribute to improved vitamin intakes, their effect on nutrition is not understood fully.

Beverages are a significant portion of the American diet, contributing to the intake of various nutrients as well as added sugars. The *Dietary Guidelines for Americans* recommend that Americans "Choose beverages and foods to moderate their intake of sugars" (U.S. Department of Agriculture [USDA] and Department of Health and Human Services [DHHS], 2000). However, a recent study found that among children age 2 to 17, 38 to 56 percent of the added sugars they consumed came from beverages (Guthrie & Morton, 2000). Because childhood obesity is rising, more information is needed to investigate the changes in children's diets over time. The purpose of this study was to investigate trends in children's beverage consumption (both prevalence and quantity) over a 10-year period.

Methods

Survey Design

Data were obtained from the National Family Opinion Research/Beverage Unit's Share of Intake Panel (SIP) (National Family Opinion Group [NFO], 1999; National Soft Drink Association [NSDA], 1999), a syndicated marketing research program at the national level. Since 1980, SIP has used mail surveys, which are primarily purchased by industry members, to monitor beverage consumption. The survey instrument is a 2-week diary that collects all beverage intakes (excluding tap water) for all members of the selected household. Participants are told to exclude tap water, but to include bottled water. Tap water is difficult for consumers to quantify,

even though its contribution to beverage consumption may be significant. In this study, milk intake reflects only beverages; milk consumed with cereal was not included, nor was milk in other forms of dairy products (e.g., cheese).

SIP samples 3,000 individuals quarterly, for an annual total of 12,000 individuals. Mailings to 4,498 households in each quarter are staggered weekly to ensure coverage across the whole year. The sampling is done at the household level and balanced at the individual level by weighting the data quarterly to be representative of the U.S. population (age within gender, household income and size, region, and market size).

In addition to demographic information, the SIP diary collects the following information for each beverage consumed: brand and flavor, beverage attributes (e.g., diet, regular, sugar-free), time of day and month when consumed, type and size of container in which it was purchased, class of trade where drink was purchased, type of container from which it was consumed, where it was consumed (home, away, etc.), temperature of beverage when consumed (hot, cold), and quantity (in ounces) consumed at one occasion.

Because a mail survey was used to collect the data, all initial instructions were given in writing. Households were instructed how to quantify beverages (ounces or cups) by providing them with two-dimensional food models. For the children who were unable to keep their own records, another family member did so.

Data Analysis

We analyzed data from children who were age 1 to 19 years in 1987-88 (n=4,143), 1992-93 (n=2,748), and 1997-98 (n=2,397). Beverages that made the greatest contribution to total

beverage intake were used in this investigation: milk (whole, lowfat, and skim/buttermilk), carbonated soft drinks (regular and diet), fruit juices, fruit drinks, powdered soft drinks (unsweetened, presweetened, sugar-sweetened, and sugar-free), and tea (hot, cold, herbal, and ready-to-drink). "Lowfat" milk consisted of any milk not specified as either whole milk or skim milk (i.e., 1% and 2% milks). The classification of fruit juice was based on the respondents' perceptions and knowledge about the variety of beverages. "Other" beverages consisted of coffee, breakfast drinks, beer, and other forms of alcohol. Fewer than 5 percent of the children were reported to have consumed these other beverages; thus, the contribution of these beverages to the total volume of beverage intake was minor and not included in this analysis.

Of the children who drank the beverages studied, the total quantities over each 2-week survey period were converted so that we could estimate mean daily consumption (in ounces/day) for each specific age/gender group. Chi-square tests for trends were performed to observe changes in prevalence of beverage consumption over the three survey periods; Bonferroni *t*-tests were performed to test for statistical significance in mean daily intake among survey periods.

Results

Prevalence

Milk, carbonated soft drinks, and juices, respectively, were the most commonly consumed beverages across age groups (table 1). Seventy-six to 95 percent of the children consumed milk; 72 to 97 percent, carbonated soft drinks; and 53 to 79 percent, juices. The percentage of children reporting milk consumption, however, remained statistically similar over the decade.

Table 1. Children drinking selected beverages, by selected years

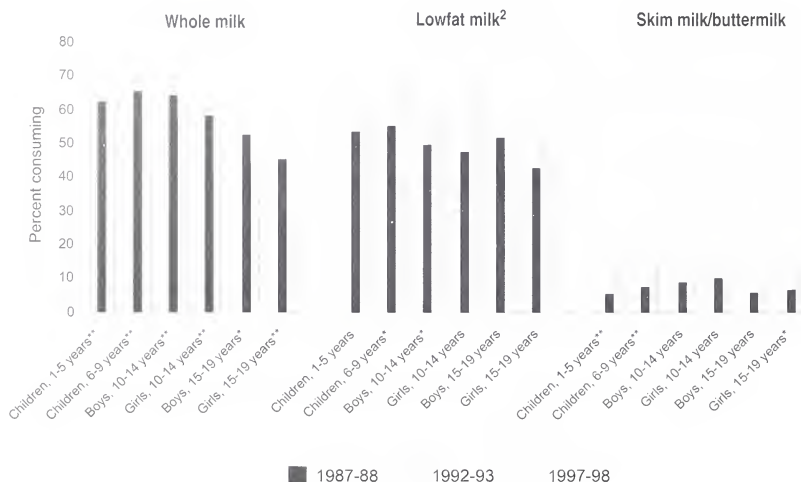
Gender/age groups	1987-88 (n=4,143)	1992-93 (n=2,748)	1997-98 (n=2,397)
		<i>Percent Milk¹</i>	
Children, 1-5 years	93.8	95.1	90.7
Children, 6-9 years	95.2	94.8	94.5
Boys, 10-14 years	92.2	92.2	87.0
Girls, 10-14 years	91.7	88.9	83.4
Boys, 15-19 years	87.2	81.7	80.9
Girls, 15-19 years	75.9	75.5	78.1
		Carbonated soft drinks	
Children, 1-5 years*	83.5	78.2	72.1
Children, 6-9 years	92.4	91.1	86.7
Boys, 10-14 years	92.6	93.6	91.4
Girls, 10-14 years	94.5	91.7	90.3
Boys, 15-19 years	94.6	95.9	95.2
Girls, 15-19 years**	96.8	94.8	81.9
		Juices	
Children, 1-5 years	77.3	76.7	78.5
Children, 6-9 years	74.1	68.4	68.9
Boys, 10-14 years	66.6	61.4	54.2
Girls, 10-14 years	69.5	67.4	63.0
Boys, 15-19 years	65.8	66.9	56.8
Girls, 15-19 years	63.5	63.9	53.4
		Fruit drinks	
Children, 1-5 years	53.3	55.4	61.0
Children, 6-9 years	55.6	58.9	62.1
Boys, 10-14 years	47.6	49.5	60.1
Girls, 10-14 years	49.3	54.3	56.6
Boys, 15-19 years	44.4	37.8	46.1
Girls, 15-19 years	35.9	47.4	50.2
		Powdered soft drinks	
Children, 1-5 years	54.4	50.7	45.2
Children, 6-9 years*	59.1	52.8	44.4
Boys, 10-14 years	48.5	43.8	40.8
Girls, 10-14 years	52.7	40.7	43.0
Boys, 15-19 years	35.7	35.9	26.8
Girls, 15-19 years	27.5	30.2	23.1
		Tea	
Children, 1-5 years**	32.6	21.2	17.3
Children, 6-9 years*	37.3	23.4	20.3
Boys, 10-14 years	42.0	35.6	37.1
Girls, 10-14 years*	42.3	40.4	26.4
Boys, 15-19 years	41.0	39.3	41.5
Girls, 15-19 years	50.9	36.0	31.8

¹Contains milk beverages only. Milk consumed with cereal or milk in other forms (e.g., cheese) is not included.

* $p < 0.05$, ** $p < 0.001$ = significant difference in percentages across selected years.

Note: Beverage consumption was gauged if a child consumed at least one serving of the beverage over a 2-week period.

Figure 1. Children consuming whole, lowfat, and skim milk/buttermilk,¹ by selected years



¹Contains milk beverages only. Milk consumed with cereal or milk in other forms (e.g., cheese) is not included.

²1% and 2% milks.

*p<0.05, **p<0.001 = significant differences in percentages across the selected years.

The prevalence of milk consumption was lowest for girls age 15 to 19, compared with the other age groups. A little more than three-fourths of 15- to 19-year-old girls reported any milk consumption during the three 2-week reporting periods (76 percent in 1987-88, 76 percent in 1992-93, and 78 percent in 1997-98).

From 1987-88 to 1997-98, while a significant decline occurred in the percentage of children in all age groups who drank whole milk, a rise occurred in the percentage consuming lowfat and skim/buttermilk (fig. 1). By 1992-93, the percentage of children drinking lowfat milk exceeded the percentages of children drinking whole milk in all age groups. By 1997-98, 52 to 68 percent of the children in the various age/gender groups drank lowfat milk;

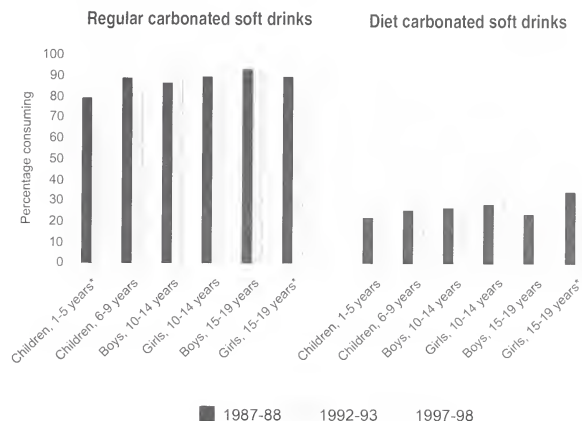
whereas, 22 to 47 percent of the children consumed whole milk. The percentage of children drinking skim/buttermilk increased over the decade, particularly among younger children and 15- to 19-year-old girls. About 20 percent of girls age 10 to 19 years consumed skim/buttermilk in 1997-98.

The percentage of children drinking carbonated soft drinks did not change for most of the children age 6 to 9, girls age 10 to 14, or boys age 10 to 14 and 15 to 19 (table 1). There was, however, a significant decline in the percentage of children age 1 to 5 and girls age 15 to 19 who consumed carbonated soft drinks. During 1987-88, 84 percent of 1- to 5-year-olds consumed carbonated soft drinks; by 1997-98, 72 percent consumed this type of beverage. During

1987-89, 97 percent of girls age 15 to 19 consumed carbonated soft drinks, compared with 82 percent by 1997-98, a drop of 15 percentage points.

Over the survey period, the percentage of children who drank either regular or diet carbonated soft drinks remained stable, except for 1- to 5- and 15- to 19-year-old girls (fig. 2). The percentage of the youngest children (age 1 to 5 years) who consumed regular carbonated soft drinks decreased significantly: dropping from 79 to 69 percent. The percentage of the older girls (15 to 19 years) who drank regular or diet carbonated soft drinks also decreased significantly: from 90 to 77 percent in 1987-88 (regular) and 35 to 18 percent, in 1997-98 (diet).

Figure 2. Children consuming carbonated soft drinks, by selected years



* $p < 0.05$ = significant difference in percentages across the selected years.

... we found no significant decline in the prevalence of children's milk consumption over the past decade, nor did we find an increase in the prevalence of carbonated soft drink consumption.

Over the survey periods, the percentage of children reporting juice consumption decreased slightly (table 1). However, the percentage of children among all age groups consuming fruit drinks increased over the 10-year period—although none of the differences were statistically significant. The number of children consuming powdered soft drinks decreased significantly among younger children (6 to 9 years), dropping from 59 to 44 percent. The number of children consuming tea also decreased significantly across the survey period for three age groups—children age 1 to 5 (33 to 17 percent), children age 6 to 9 (37 to 20 percent), and girls age 10 to 14 (42 to 26 percent).

Quantity

Boys consumed more milk than did girls in the same age group, and young children (1 to 9 years) drank more milk than any other beverages across all three periods. Mean daily milk intake

increased significantly for children age 1 to 5: from 11.6 to 13.5 oz between 1987-88 and 1997-98 (table 2).

Children age 1 to 5 years decreased significantly their mean daily intake of carbonated soft drinks: from 5.2 to 3.7 oz/day between 1987-88 and 1997-98. The amount consumed by the other age/gender groups did not change significantly. Younger children (1 to 9 years) drank more milk (12 to 14 oz/day) than carbonated soft drinks (4 to 8 oz/day), but older children (10 to 19 years) consumed more carbonated soft drinks (12 to 23 oz/day) than milk (9 to 15 oz/day).

For children age 1 to 5 years, the quantity of fruit juice consumed increased significantly, from 5.0 to 7.0 oz/day during the 10-year period. For boys age 10 to 14 years, however, the quantity consumed decreased significantly from 4.5 to 3.3 oz/day. The average amount of fruit juice

remained stable for the other age/gender groups, with no group consuming more than 7.0 oz/day, on average.

The mean daily intake of fruit drinks for all age/gender groups increased across the decade. The quantities consumed were similar for all age groups and were slightly less than the mean quantities of fruit juice consumed. The quantity of tea consumed was negligible (despite its prevalence among older children) and was therefore not included in calculating estimates of mean daily consumption.

While the mean intake of fruit drinks increased over the decade, the average amount of noncarbonated soft drinks made from a powdered mix declined significantly. This decrease was most apparent for 15- to 19-year-old boys (from 4.6 to 2.1 oz/day).

Discussion

Prevalence

In light of the conclusion made by Hamack and colleagues (1999) that carbonated beverages have displaced milk consumption, we found no significant decline in the prevalence of children's milk consumption over the past decade, nor did we find an increase in the prevalence of carbonated soft drink consumption. An equally important trend is that children tended to shift from drinking whole milk to lower fat varieties over the decade, with lowfat milk being the favorite type of milk to drink by 1997-98.

Carbonated beverages continue to be a popular drink for children and adolescents. In 1997-98 carbonated soft drink intake was reported by 72 percent of even the youngest children (age 1 to

Table 2. Children's mean daily intake¹ of selected beverages,² by selected years

	1987-88 (n=4,143)	1992-93 (n=2,748)	1997-98 (n=2,397)
<i>(Ounces/day)</i>			
Milk³			
Children, 1-5 years	11.6 ^a	12.5 ^b	13.5 ^b
Children, 6-9 years	12.2 ^a	13.0 ^b	12.1 ^{ab}
Boys, 10-14 years	13.6	13.7	12.5
Girls, 10-14 years	11.9	11.6	11.2
Boys, 15-19 years	14.7	12.7	11.7
Girls, 15-19 years	9.7	8.9	10.7
Carbonated soft drinks			
Children, 1-5 years	5.2 ^a	4.4 ^b	3.7 ^c
Children, 6-9 years	7.4	7.8	7.7
Boys, 10-14 years	13.6	15.6	14.6
Girls, 10-14 years	12.3	12.1	12.5
Boys, 15-19 years	22.0	21.4	22.9
Girls, 15-19 years	19.8	17.3	16.1
Juices			
Children, 1-5 years	5.0 ^a	6.3 ^b	7.0 ^b
Children, 6-9 years	4.0	4.0	4.0
Boys, 10-14 years	4.5 ^a	3.5 ^b	3.3 ^b
Girls, 10-14 years	3.7	3.5	3.3
Boys, 15-19 years	4.3	4.4	4.3
Girls, 15-19 years	3.7	4.0	3.3
Fruit drinks			
Children, 1-5 years	2.1 ^a	2.8 ^b	2.9 ^b
Children, 6-9 years	2.2 ^a	2.8 ^b	2.9 ^b
Boys, 10-14 years	3.1 ^a	2.4 ^b	3.7 ^a
Girls, 10-14 years	2.3 ^a	2.5 ^a	3.6 ^b
Boys, 15-19 years	2.9 ^{ab}	2.4 ^a	3.8 ^b
Girls, 15-19 years	1.7 ^a	3.5 ^b	3.1 ^b
Powdered soft drinks			
Children, 1-5 years	4.0 ^a	3.5 ^b	3.5 ^b
Children, 6-9 years	4.4 ^a	4.8 ^a	3.3 ^b
Boys, 10-14 years	4.8 ^a	3.4 ^b	3.4 ^{ab}
Girls, 10-14 years	4.1 ^a	2.9 ^b	3.4 ^{ab}
Boys, 15-19 years	4.6 ^a	4.1 ^a	2.1 ^b
Girls, 15-19 years	1.6 ^a	2.3 ^b	1.7 ^{ab}

¹Mean daily intakes are among those children who reported consumption.

²Significance is noted only when quantities are significantly different between at least two of the three periods for an age/gender group. Groups that share the same letter, however, are not significantly different at $p < 0.05$.

³Contains milk beverages only. Milk consumed with cereal or milk in other forms (e.g., cheese) is not included.

5 years), and it was considerably more prevalent among preteens and adolescents during the 2-week reporting periods in this study. These results are somewhat higher than those previously reported in the Continuing Survey of Food Intakes by Individuals (CSFII) (Federation of American Societies for Experimental Biology [FASEB], 1995; USDA, 1997). In the CSFII 1994-96, 37 percent of 3- to 5-year-olds, 48 and 44 percent of 6- to 11-year-old boys and girls, respectively, and 69 and 62 percent of 12- to 19-year-old boys and girls consumed carbonated soft drinks over a 2-day reference period. It is possible that differences in study design between SIP and the CSFII may have influenced the results. (CSFII used 2 days of dietary recalls to indicate prevalence, compared with 2 weeks used by SIP.) The data in this study show no increase in the prevalence of carbonated soft drinks during the reporting periods and show that the percentage of children age 1 to 5 and girls age 15 to 19 who reported drinking soft drinks actually decreased over time.

Quantity

The mean daily intake of milk by adolescent girls has remained relatively stable—although well below recommended quantities. In 1997-98 the average daily milk intake by girls age 10 to 14 and 15 to 19 years accounts for about 30 percent of the Dietary Reference Intake (DRI) for calcium (Baker et al., 2000; National Academy of Sciences [NAS], 1999). Ballew, Kuester, and Gillespie (2000) reported a concern for girls with a strong positive correlation between milk consumption and adequate intakes of vitamins A and B₁₂, folate, calcium, and magnesium. On the other hand, the amount of milk consumed by children 1 to 5 years old increased significantly and represents nearly 85 percent of the minimum recommended amount (2 to 3 8-oz servings of milk or its

equivalent) from the Food Guide Pyramid dairy group with fluid milk alone (not including milk on cereal or in other forms, such as cheeses), indicating that the increase in mean daily intake is an encouraging change.

Among those children who reported consuming carbonated soft drinks, the mean daily intake did not change for most age and gender groups. Other studies observed significant increases in the quantity of carbonated soft drinks consumed (FASEB, 1995; USDA, 1997; Troiano, Briefel, Carroll, & Bialostosky, 2000). Harnack, Stang, and Story (1999) found a strong association between increased consumption of soft drinks and decreased consumption of milk and juice. They also reported that children who drank 9 or more ounces of carbonated soft drinks per day consumed significantly more energy than those who drank less than 9 oz. Intake of carbonated beverages, especially colas, was implicated as a risk factor for bone fracture in some studies (Goulding et al., 1998; Petridou, Karpathios, Dessypris, Simou, & Trichopoulos, 1997), although other research does not suggest such a link (Heaney & Rafferty, 2001).

The trends we observed in teenage girls' consumption of milk may be a concern regarding the development and maintenance of healthy bones. The importance of milk/dairy consumption should be emphasized to encourage adequate calcium intakes. Girls continued to consume nearly twice the amount of carbonated soft drinks, compared with milk; however, with the quantity of carbonated soft drink intake stable, and a decreased prevalence, no data in our study support the theory that carbonated soft drinks are displacing milk in children's diets.

Some have suggested that carbonated soft drinks displace more healthful

... children tended to shift from drinking whole milk to lower fat varieties over the decade, with lowfat milk being the favorite type of milk to drink by 1997-98.

beverages (Tanasescu, Ferris, Himmelgreen, Rodriguez, & Perez-Iscamilla, 2000; Cavadini, Siega-Riz, & Popkin, 2000). Despite the lack of data showing an increase in the quantity of carbonated soft drinks consumed over the decade, the average daily intake of fruit juice remained fairly stable across most age groups, increased significantly by 2 oz/day among children age 1 to 5 years, and decreased significantly by 1 oz/day for boys age 10 to 14 years. Based on Food Guide Pyramid recommendations (USDA & DHHS, 1995), these data indicate that fruit juice accounted for over half of the recommended minimum number of servings per day (i.e., 2 6-oz servings of juice).

The quantity of fruit drinks consumed increased significantly over the decade. Fruit drinks have been heavily marketed to children and packaged for handy snacking (Russo, 1998). Although they generally have higher added sugar content than do fruit juices, many have been fortified with essential vitamins and minerals. When one manufacturer added calcium to fruit juice and fruit drinks in 1998, the sales response was so strong that other companies expanded calcium fortification of their product lines (Anonymous, 1999a). These beverages may make increasingly important contributions to children's diets, and an increase in their consumption may be beneficial if fortified fruit drinks with reduced amounts of added sugars are selected. Despite the benefits of fruit drinks, the trend toward increased consumption and prevalence may be a concern if consumption of other beverages is decreased as a result.

Strengths/Limitations

While our data provide an overview of changes in children's consumption patterns over the past decade, strengths as well as limitations of this study should be considered. A major strength

of our data is that 2 weeks of information on consumed beverages were collected in a journal instead of on a recall basis. Respondents only recorded their beverage intake and not foods, as is required for a full food record, so the respondents' burden may have been reduced. Another strength is that the methods of data collection for this study have not changed in the past two decades, making comparisons of survey years straightforward. In some other surveys, collection methods have changed for each survey period, complicating the results and interpretation.

Although the samples were collected in the same manner throughout the study period—with specific attention given to obtaining a nationally representative sample—some sample response bias that is inherent to all surveys may have occurred over time (Bingham & Day, 1997). No oral instructions or three-dimensional food models were given to assist the respondents in quantifying and classifying the beverages; thus, any incongruence between the respondents' knowledge and factual definitions remained.

Implications

In this study, it was not possible to determine what the trend in total beverage intake is, because tap water was not included in the data collection, and it was not the study's purpose. It is simply not viable to say that one beverage is displacing another, since it could be merely increasing in addition to other fluids (e.g., tap water). The role that each beverage type plays in overall fluid consumption needs to be addressed in future research endeavors. Theoretically, the method for data collection is better in a randomly sampled population; however, the results from other panel samples yielded results similar to those in the

randomly sampled CSFII population. Although more research is needed to examine specific populations at risk, children (and their parents if the children are too young to decide themselves) have been somewhat successful in making more healthful food selections (e.g., skim milk vs. whole milk). This verification of successful changes in dietary behaviors encourages future nutrition education efforts to include beverage selections as a part of dietary habits that promote healthful lifestyles.

Children's intake of calcium—estimated by the average amount of milk consumed—still falls below the recommended calcium intakes for all age groups. This study demonstrated some discrepancy between recommendations for children's dietary intake and actual intake of certain beverages. Significant changes in children's diets over the 10-year period include an increase in the amounts of milk and juice consumed by younger children, a decrease in the quantity of carbonated soft drinks consumed by 1- to 5-year-old children and 15- to 19-year-old girls, as well as an increase in the quantity of fruit drinks consumed by children of all ages. Hence, it is imperative to assess the contribution that beverages make to micro- and macronutrient intakes.

The trends in beverage consumption are only one area of overall dietary intake that we explored. The effects that beverages have on nutrition and healthful dietary patterns need to be investigated further. Changes in beverage consumption may be an indicator of overall changes in diet, but this has yet to be determined. Little is known about the lifestyles and habits related to beverage consumption, which could play an important role within trends. The trends in children's beverage consumption in the past 10 to 15 years provide insight into potential

educational programs that may help improve children's dietary habits and health. Once detailed information is obtained regarding precise populations at risk, educational strategies can be implemented to encourage and facilitate change.

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Insight 23
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The Role of Nuts in a Healthy Diet

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While not a staple in the American diet, nuts are consumed by many Americans. This *Nutrition Insight* examines the contribution nuts can make to a diet, consumption of nuts, characteristics of people who eat nuts, and the association of nut consumption with diet quality. Nuts are generally divided into two groups—tree nuts (almonds, pecans, etc.) and peanuts. Peanuts, technically a legume (a dried pea, bean, or lentil), are typically included in the nut group because they are used in a manner comparable to nuts and have a similar nutrient profile.

Contributions of Nuts to the Diet

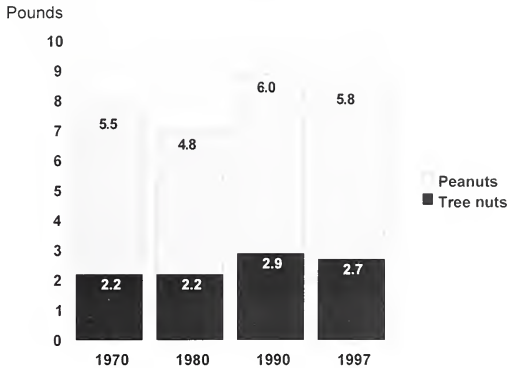
Nut consumption can make beneficial contributions to the diet but at a cost—increased calories. Recent research indicates that frequency of nut consumption may have an inverse association with the risk of heart disease for men, women, and the elderly (Sabate, 1999). Eating nuts also seems to lower serum cholesterol and favorably changes a person's lipoprotein profile (Sabate, 1993). Walnuts have specifically been studied for their effect on serum lipids and blood pressure. Results have shown that incorporating a moderate amount of walnuts into a cholesterol-lowering diet decreases serum total cholesterol levels and favorably changes the lipoprotein profile in healthy men (Sabate et al., 1993).

Growing evidence shows that nuts have bioactive constituents (like plant protein, dietary fiber, and some micronutrients) that elicit protective effects on the heart. When subjects ate test diets including nuts, the cholesterol-lowering response was greater than predicted. This suggested that constituents of nuts, other than fatty acids, have additional cholesterol-lowering effects (Kris-Etherton et al., 1999). Findings from epidemiologic studies suggest an inverse association between death from stroke and intake of the most concentrated food sources of vitamin E, such as nuts (Yochum et al., 2000). A review of the beneficial effects of vegetarian foods, including nuts, also has shown such foods lead to improved control of blood-glucose concentration, lower insulin requirements, and better weight control for diabetic patients (Segasothy et al., 1999).

Nut Consumption in the United States

Annual per capita consumption of nuts in the United States (based on food disappearance data) has ranged from 7.0 to 8.9 pounds over the 1970-97 period (fig. 1). Nut consumption decreased slightly between 1990 and 1997 (8.9 to 8.5 pounds). Peanuts (which include peanuts in peanut butter and candy) accounted for most of this nut consumption—68 percent of total nut consumption in 1997. Tree nuts

Figure 1. Annual per capita consumption of nuts



Source: U.S. Department of Agriculture, Economic Research Service.

accounted for the minority share of per capita nut consumption. In 1997, the most commonly consumed tree nuts were almonds (19 percent of per capita tree nut consumption), coconuts (18 percent), pecans (17 percent), and walnuts (17 percent). As a percentage of total annual per capita consumption of food, nuts accounted for a very small share, compared with other foods. For example, the per capita consumption of meat, poultry, and fish was 190 pounds in 1997, compared with 8.5 pounds for all nuts (Putnam et al., 1999).

Nut Eaters and the Quality of Their Diet

Who in the United States eats nuts? And what is the quality of their diet? To answer these questions, we used data from the Market Research Corporation of America (MRCA) Information Services. We used information from 6,928 people for the 1992-94 period; these data were weighted to provide

population estimates. MRCA collected information on people's consumption of nuts based on detailed diaries of foods eaten over a 14-day period. "Nut eaters" were defined as people who consumed any type of nut over a 14-day period, and "non-nut eaters" were defined as people who did not consume any type of nut over this same period. Forty-one percent of people were "nut eaters," and 59 percent were "non-nut eaters."

Of the five characteristics examined (gender, age, income, race, and region of residence), age and race of nut eaters and non-nut eaters were significantly different (table 1). Compared with non-nut eaters, a significantly higher percentage of nut eaters were younger and were White. Among nut eaters, 37 percent were under age 19, compared with 25 percent of non-nut eaters. In addition, among nut eaters, 90 percent were White, compared with 86 percent of non-nut eaters.

To answer the question of whether nut eaters have a better diet than do non-nut eaters, we used a modified version of the Healthy Eating Index (HEI). This modified version uses 9 of the original 10 HEI components. Components 1-5 measure the degree to which a person's diet conforms to serving recommendations of the Food Guide Pyramid food groups: Grains (bread, cereal, rice, and pasta), vegetables, fruits, milk (milk, yogurt, and cheese), and meat (meat, poultry, fish, dry beans, eggs, and nuts). As a percentage of total intake of food energy, component 6 measures consumption of total fat; component 7, saturated fat. Component 8 measures total cholesterol intake; component 9, sodium intake. The score for each component ranges from zero to 10, with higher component scores indicating intakes that are closer to recommendations. The MRCA data set does not provide enough information to calculate the variety of a person's diet (component 10 of the original HEI), so variety was not calculated. All total HEI scores on the modified version were adjusted to a 100-point scale. Scores greater than 80 imply a good diet; between 51 and 80, a diet that needs improvement; and less than 51, a poor diet.

For nut eaters, the mean score on the modified HEI was slightly, but significantly, higher than the score for non-nut eaters (60.8 vs. 56.9). Both groups, however, had total scores that indicated their diet needed improvement. The average daily caloric intake of nut eaters also was significantly higher—about 10 percent—than that of non-nut eaters. On the individual components of the HEI, nut eaters, compared with non-nut eaters, had significantly higher scores for grains, fruits, milk, fat, saturated fat, and cholesterol. The higher HEI fat score—indicating nut eaters consume less fat as a percentage of total calories—may seem surprising because nuts contain fat. It appears that nut eaters consume less fat from other

Table 1. Characteristics of nut eaters and non-nut eaters, 1992-94

Characteristic	Nut eaters	Non-nut eaters
	Percent	
Gender		
Male	47	46
Female	53	54
Age (years)*		
<19	37	25
19 - 51	36	51
>51	27	24
Income		
200% of poverty or less	45	42
More than 200% of poverty	55	58
Race*		
White	90	86
Non-White	10	14
Region		
Northeast	19	20
South	25	25
Midwest	33	35
West	23	20

*Significant at .05 level, based on unweighted data.

foods in their diet, compared with non-nut eaters, or given their caloric level is higher, they consume less fat as a percentage of total energy. Non-nut eaters had significantly higher scores for vegetables and sodium that did nut eaters. The meat score for the two groups was not significantly different.

Other factors (such as age and race) may influence the modified HEI scores of nut eaters and non-nut eaters. However, even when using multivariate analytic procedures to control for all five characteristics previously examined, we found that the modified HEI score for nut eaters was significantly higher than the score for non-nut eaters.

Conclusion

Although nut consumption is low, compared with other protein sources such as meat and poultry, nuts provide many of the same nutrients to the diet and have potential health benefits. A significantly higher percentage of nut eaters than non-nut eaters were younger and were White. In addition, compared with non-nut eaters, nut eaters had a slightly better diet, albeit one that needed improvement.

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Food Trade-Offs: Choosing How to Balance the Diet

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People often make “food trade-offs” to balance their diet. For example, a person may choose to eat lowfat frozen yogurt rather than regular ice cream. The trade-offs that people make, who makes these trade-offs, and how these trade-offs affect their diet are of interest to nutrition educators. This Insight examines in-depth the food trade-offs people make. From a list of 14 foods, people indicated whether they used any of five trade-offs to balance the nutrition in their diet. Most people made at least one food trade-off—typically limiting how often they ate a food. And those who made food trade-offs had a more healthful diet, compared with those who made none.

Source of Data

We used data from Market Research Corporation of America (MRCA) Information Services for this analysis. MRCA conducts a National Consumer Panel. Households are selected based on demographic criteria matched to the U.S. Census. We used information from 5,787 adults in these households for the 1992-94 period. All data were weighted to the population.

These adults were asked what food trade-offs they typically made to balance the nutrition in their diet when they ate 14 foods: red meat, eggs, cheese, breads, margarine, salad dressing, chips, pretzels, sugared soft drinks, ice cream, cakes, cookies, sweet rolls/donuts, and sugar. These foods are typically characterized as being high in

fat, cholesterol, sodium, and/or calories. MRCA compiled a list of food trade-offs people may use and verified the list in the pretesting phase of data collection. People could select one or more of five trade-offs they made with regards to each food: limit how often eaten, limit portion size, give up some other food (e.g., consume ice cream, but do not consume cake because of this), substitute a healthier version of food (e.g., consume extra lean red meat rather than regular red meat), or substitute a food item with another food item at other times (e.g., consume chips as a snack today, but consume an apple as a snack tomorrow). So, for each food, people could make no trade-off or could make up to five trade-offs. The maximum number of trade-offs they could make for all 14 foods was 60.

Most People Make Food Trade-Offs

Most people (86 percent) reported making at least one food trade-off (fig. 1). Forty-one percent reported making 1 to 10 food trade-offs, and 45 percent reported making 11 or more trade-offs. The trade-off most often reported was limiting how often a particular food was eaten: 82 percent of the people said they made this trade-off for at least one of the 14 foods (fig. 2). The next trade-off that was most frequently used was limiting the portion size: 53 percent of the people said they made this trade-off for at least one of the 14 foods. The least likely trade-off strategies people used were

substituting a healthier version of the food (18 percent), substituting with another food at other times (10 percent), and giving up some other food (8 percent).

Some People More Likely Than Others to Make Food Trade-Offs

Personal characteristics influence one's likelihood to make food trade-offs. Of the characteristics examined, gender, age, race, and education were significantly different for people making food trade-offs (table). Compared with males, females were much more likely to make a food trade-off. Ninety-two percent of females reported making at least one food trade-off; 79 percent of males reported making a trade-off. Older adults were more likely to make a food trade-off than were their younger counterparts: 90 percent of people ages 51 and over versus 76 percent of people ages 18 to 30 made a trade-off.

Non-whites were more likely to make a food trade-off than were whites (91 vs. 85 percent). People with more education also were more likely to make a food trade-off. Ninety percent of adults with more than a high school diploma made a food trade-off; 82 percent of adults with a high school diploma or less did so.

People Who Make Food Trade-Offs Have a "Better Diet"

To answer the question of whether people who use a food trade-off have a "better diet" than those who do not, we used a modified version of the Healthy Eating Index (HEI). This version uses 9 of the original 10 HEI components.

Figure 1. People are likely to use tradeoffs to balance their diet

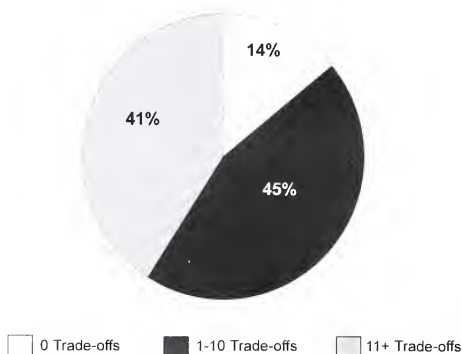


Figure 2. People are most likely to limit how often certain foods are eaten

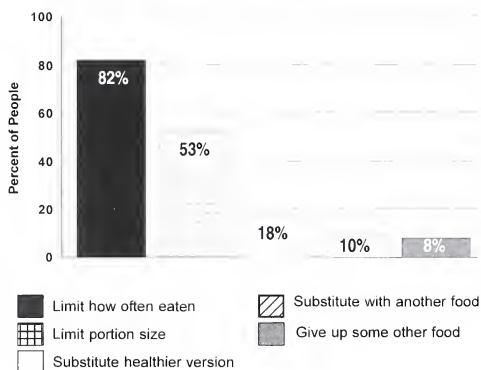


Table. Food trade-offs are influenced by people's characteristics

Characteristic	Made trade-offs	Did not make trade-offs
<i>Percent</i>		
Gender*		
Male	79	21
Female	92	8
Age*		
18-30	76	24
31-50	87	13
51+	90	10
Income		
< \$21,000	85	15
\$21,000-\$40,000	85	15
\$41,000+	89	11
Race*		
White	85	15
Non-white	91	9
Education*		
12 years of education or less	82	18
More than 12 years of education	90	10

* Significant at .05 level, based on unweighted data.

Components 1-5 measure the degree to which a person's diet conforms to serving recommendations of the Food Guide Pyramid food groups: Grains (bread, cereal, rice, and pasta), vegetables, fruits, milk (milk, yogurt, and cheese), and meat (meat, poultry, fish, dry beans, eggs, and nuts). As a percentage of total intake of food energy, component 6 measures consumption of total fat; component 7, saturated fat. Component 8 measures total cholesterol intake; component 9, sodium intake. The score for each component ranges from zero to 10. The MRCA data set does not provide enough information to calculate the variety of a person's diet (component 10 of the original HEI), so variety was not calculated. All total HEI scores on the modified version were adjusted to a

100-point scale. Scores greater than 80 imply a "good diet"; between 51 and 80, a diet that "needs improvement"; and less than 51, a "poor diet."

Adults who reported making 11 or more food trade-offs for the 14 foods had a significantly higher HEI score (60.0) than was the case for adults who reported making 1 to 10 trade-offs (57.0) and for adults who reported making no food trade-offs (53.5). Additional analysis showed that adults who made at least one food trade-off, compared with those who made no trade-offs, had significantly higher HEI component scores for grains, fruit, vegetables, fat, saturated fat, and cholesterol. These higher scores indicate that people had intakes that were closer to recommendations for these HEI components.

Conclusion

Most people report making food trade-offs to balance the nutrition in their diet. The most common trade-offs are limiting how often a food is eaten and limiting portion size. People who make such trade-offs have a better diet than those who do not (although both groups had average HEI scores indicating a diet that "needed improvement"). Nutrition educators may find this information on food trade-offs helpful in the design of realistic nutrition intervention programs and individual counseling and as a technique for encouraging healthful eating.

Research and Evaluation Activities in USDA

From the Food and Nutrition Service; Office of Analysis, Nutrition, and Evaluation

The School Breakfast Pilot Project

The School Breakfast Program, authorized by the Child Nutrition Act of 1966, started as a pilot program to provide funding for school breakfasts to children in poor areas and areas where they had to travel a great distance to school. The intent was to provide a nutritious breakfast to children who might otherwise not receive one. The importance of a nutritious breakfast is supported by the growing body of evidence that has linked it to improved dietary status and enhanced school performance. Hence, many observers have urged that school breakfasts become more available.

Despite an increase in the number of schools offering the School Breakfast Program, the percentage of students who eat school breakfasts is considerably lower than the percentage who eat school lunch. Those eating school breakfasts are more likely to be poor and qualify for free or reduced-price breakfasts. Some people believe that a universal-free program would result in more children consuming a nutritious breakfast and beginning the school day with proper nutrition and ready to learn.

Within this context, Congress passed Section 109 of the William F. Goodling Child Nutrition Act of 1998 (P.L. 105-336), which authorized the Secretary of Agriculture, through the U.S. Department of Agriculture's Food and Nutrition Service (FNS), to conduct a 3-year pilot project beginning in the

2000-2001 school year that provided free school breakfasts to all students regardless of family income.

Six of the 386 school districts were selected from those that applied to participate in the pilot project:

- Boise, Idaho: Independent School District of Boise
- Columbiana, Alabama: Shelby County Board of Education
- Gulfport, Mississippi: Harrison County School District
- Phoenix, Arizona: Washington Elementary School District
- Santa Rosa, California: Santa Rosa City Schools
- Wichita, Kansas: Wichita Public Schools

A total of 143 elementary school units from the participating districts were grouped into matched pairs on the basis of several demographic variables. One school unit in each pair was randomly assigned to the treatment group (universal-free school breakfast) or the control group (regular school breakfast). Within each treatment and control school unit, about 30 students were selected for the evaluation. The total student sample size was 4,290 (2,190 treatment and 2,100 control). Data were collected from students, parents, teachers, school district staff, and school records during spring 2001.

FNS's evaluation of the 3-year project consists of an implementation study and an impact study. The implementation study describes how the schools choose to implement universal-free school breakfast, assesses the effect of students' participation in the universal-free school breakfast on administrative requirements and costs at the school and federal levels, and assesses nutrient

composition of the school breakfasts. The impact study assesses the effects of universal-free breakfast on a broad range of student outcomes: including school breakfast participation, breakfast consumption patterns, dietary intake, food security status, school attendance and tardiness, child health, cognitive functioning, classroom behavior and attentiveness, and academic achievement.

An interim report that provides results from the first year of the pilot was published in October 2002; a final report, in summer 2004. Additional information on the School Breakfast Pilot Project can be found at <http://www.fns.usda.gov/OANE/MENU/sbppilot/sbpnotice.htm>.

National School Lunch Program Application/Verification Pilot Projects

This project responds to FNS's growing concern about program integrity issues associated with the current system by which School Food Authorities determine eligibility for free and reduced-price school meals. Twenty-two School Food Authorities across 16 States began testing pilot procedures in 2000-2001 to determine and verify children's eligibility for free and reduced-price school meals. Three models are being tested over a 3-year period to determine eligibility for these school meals: Up-Front Documentation, Graduated Verification, and Verify Direct Certification. Evaluation of the models will permit FNS to explore a variety of options to improve the targeting of free and reduced-price meals to income-eligible children.

The Year One Report will provide a descriptive statistical analysis of data FNS has collected from 19 School Food Authorities in 14 States that operated the pilot project in fiscal year 2000-2001. FNS is collecting administrative data from the participating pilot sites regarding several key program statistics such as percentage of children approved for free meals and reduced-price meals, number of meals served at free and reduced-price levels, and results of graduated and direct certification verification. Data reported by School Food Authorities to FNS for this purpose represent information all School Food Authorities are required to maintain for reporting purposes. These data allow FNS to compare changes in key program statistics in these School Food Authorities between the first pilot school year and the 2 pre-pilot years.

FNS anticipates conducting a more rigorous evaluation of the Up-Front Documentation and Graduated Verification pilot projects. Central to this evaluation are a comparison of the free and reduced-price approval status and an independent collection of income information for households in the pilot School Food Authorities. Hence, FNS will be able to address a broader range of issues than is possible through exclusive reliance upon School Food Authorities' administrative data. Results from this evaluation are scheduled for release in fiscal year 2003.

Characteristics of Food Stamp Households

During each month of fiscal year 2000, about 17.2 million people living in 7.3 million U.S. households received food stamps.

- **Most food stamp recipients are children or the elderly.** Over half (51 percent) are children; 10 percent, age 60 or older. Working-age women represent 27 percent of the caseload; working-age men, 11 percent.
- **Most food stamp households do not receive cash welfare benefits.** Nearly a third (32 percent) receive Supplemental Security Income; one-quarter (25 percent), Temporary Assistance for Needy Families benefits; and one-quarter (25 percent), Social Security benefits. Eight percent have no cash income of any kind.
- **Many food stamp recipients work.** Over one-fourth (27 percent) of food stamp households have earnings, the primary source of their income.
- **Food stamp households have little income.** Only 11 percent are above the poverty line, while 33 percent have incomes at or below half the poverty line. The typical food stamp households have gross income of \$620 per month and receive a monthly food stamp benefit of \$158. Food stamps account for over one-fifth of monthly funds (cash income plus food stamps) available to a typical household.
- **Food stamp households possess few resources.** The average food stamp household possesses only about \$156 in countable resources (including the nonexcluded portion of vehicles and the entire value of checking and savings accounts and other savings).
- **Most food stamp households are small.** The average food stamp household size is 2.3 but varies considerably by household composition. Households with children are relatively large, averaging 3.4 members. Households with elderly members tend to be smaller, averaging 1.3 members.

For more information on the *Characteristics of Food Stamp Households: Fiscal Year 2000*, visit www.fns.usda.gov/OANE/MENU/published/FSP/Participation.htm.

Rates of Food Stamp Program Participation

An important measure of a program's performance is its ability to reach its target population. For over 15 years, the national food stamp participation rate—the percentage of eligible people who participate actively in the program—has been a standard for assessing the program's performance. *Trends in Food Stamp Program Participation Rates: 1994-1999* provides the latest information on the program's participation rates, based on data from the Census Bureau's Current Population Survey and administrative data.

Overall Trends: Participation rates fell by 17 percentage points between 1994 and 1999. While the number of eligible individuals fell by 16 percent, the number of participating individuals fell by 35 percent. The overall participation rate among people eligible for benefits was 57 percent in 1999, down from a high of 74 percent in 1994.

Trends Among Subgroups: Participation rates among children declined each year between 1994 and 1999, dropping from nearly 90 percent in 1994 to 68 percent by 1999. The decrease occurred between both preschool children and school-aged children. Participation rates fell both for individuals in single-parent households and for those in married-couple families with children.

By contrast, participation rates between 1994 and 1999 were fairly stable but constantly low among the elderly: about 30 percent of eligible seniors

participated. Among the disabled, about half of the eligible participants participated between 1994 and 1997. However, their participation rate rose to 61 percent by 1999. Participation rates declined each year among individuals living in households without any workers, dropping from 85 percent in 1994 to 70 percent in 1999. Among working-poor households, participation rates among those who were eligible were stable between 1994 and 1997 but fell between 1997 and 1999; an average of 53 and 48 percent, respectively.

Contrary to expectations, participation rates have fallen most rapidly among those living in *households that qualify for the largest benefits* (over half of the maximum allotment). In 1994, 98 percent of these individuals participated; by 1999, 78 percent participated. These households generally have the lowest income, relative to their household size.

Assessment of Computer Matching in the Food Stamp Program

Computer matching is a powerful management tool, which has increased the integrity and efficiency of the Food Stamp Program. This study examined how States are currently using or planning to use computer-matching strategies for error reduction.

Since 1991, States, in general, have significantly increased their use of computer matching to enhance program integrity. Advances in computer technology facilitated development of strategies to make fraud more difficult to commit and easier to detect. Technological advances, particularly the growth in communications networks, greatly increased States' matching capability, which led to more rapid

responses from external databases. For more information on Assessment of Computer Matching in the Food Stamp Program, visit <http://www.fns.usda.gov/OANE/MENU/Published/FSP/NewReleases.htm>.

FNS Planning and Performance Measurement

FNS is responsible for managing the Agency's strategic and operational planning systems. The Office of Analysis, Nutrition, and Evaluation (OANE) coordinates the Agency's contributions to the Department's strategic plan, performance plans, and performance reports, which are required by the Government Performance and Results Act (GPRA, P.L. 103-62). OANE also manages an internal process intended to align the Agency's operational priorities with the goals of the strategic and annual plans, as well as other key program and policy objectives.

One critical part of OANE's responsibilities is to identify and improve measures of program performance that link to FNS's strategic goals and objectives. The current FNS strategic plan, released in September 2000, includes two major goals and five objectives that cut across program lines and represent the shared purposes and intended outcomes of Federal nutrition assistance:

1. Improved Nutrition of Children and Low-Income People

- Improved Food Security
- Program Participants Make Healthy Food Choices
- Improved Nutritional Quality of Meals, Food Packages, Commodities, and Other Program Benefits

2. Improved Stewardship of Federal Funds

- Improved Benefit Accuracy and Reduced Fraud
- Improved Efficiency of Program Administration

For each objective, FNS has sought to develop performance measures that can be used to measure program performance and target improvement. For example, the Agency measures progress toward its objective to "improve food security" through the USDA food security measure, specifically focusing on reducing the prevalence of hunger among children and low-income people. FNS supplements the hunger measure, a subscale of the food security measure, with measures of "coverage"—the rate of participation among eligible people—for the major Federal nutrition assistance programs. Juxtaposing the prevalence of hunger among children and low-income people with rates of participation helps provide a basis for evaluating the relationship between the program participation output and the anti-hunger outcomes the programs are intended to influence.

Similarly, for its objective that "program participants make healthy food choices," FNS uses the Healthy Eating Index, a measure of diet quality developed by USDA's Center for Nutrition Policy and Promotion, to set targets to improve the nutrition status of children and low-income people. FNS also seeks to increase the rate of breastfeeding—the feeding practice judged by nutrition and health experts to be the best for infants—among mothers and infants participating in the Women, Infants, and Children (WIC) program.

A number of significant challenges exist in developing performance measures for FNS programs; three are particularly significant:

1. **Program Structure:** Most Federal nutrition assistance programs operate as partnerships between the Federal Government and State and local authorities, so the link between Agency work performance and program effectiveness is indirect.
2. **“Context” of Program Performance:** As with many other Government programs, the outcomes that the programs are intended to influence, such as reduction in hunger and improvement in diet quality, are also influenced by many factors beyond the Agency’s control.
3. **Data Limitations:** Data sources for many areas of performance are limited by constraints on Agency and program resources, including the need to reduce the burden on local program operators.

To deal with these challenges, FNS continually identifies and develops improved performance measures of its programs and operations in a number of areas. Working with program offices, OANE seeks to gain insight in specific aspects of program performance by leveraging internal Agency operational data, the results of oversight and review work; improving collection of program data; and developing stand-alone evaluation work.

Improvement in planning and performance measurement are necessarily incremental; over time, however, the broad framework of the strategic plan helps to ensure that the team and the Agency focus their efforts on the most critical areas of performance. These efforts should help the Agency gain new insights and develop and test innovative strategies that improve program effectiveness.

Federal Studies

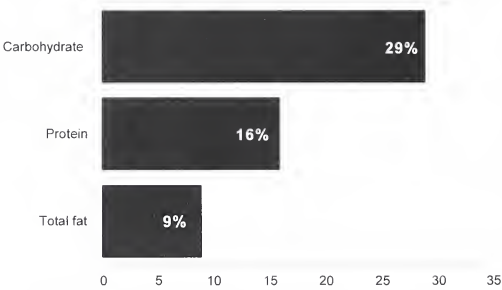
Food Supply Nutrients and Dietary Guidance, 1970-99

Using data on per person consumption and information on nutrient composition, USDA's Center for Nutrition Policy and Promotion calculates the nutrient content of the food supply. Per person consumption for each commodity is multiplied by the amount of food energy and each of 27 nutrients and dietary components in the edible portion of the food. Results for each nutrient from all foods are totaled and converted to amount per person per day. Nutrients added commercially to certain commodities (i.e., through fortification and enrichment) are also included in the nutrient content of the food supply. Food supply data represent the disappearance of food into the marketing system; therefore, per person consumption and nutrient estimates typically overstate the amount of food and nutrients people actually ingest.

Food supply providing more carbohydrates, protein, and fat

In 1999 the food supply provided 500 grams of carbohydrate, 111 grams of protein, and 164 grams of total fat per person per day. This was an increase from 1970, when the food supply provided 389 grams of carbohydrate, 96 grams of protein, and 151 grams of total fat per person per day.

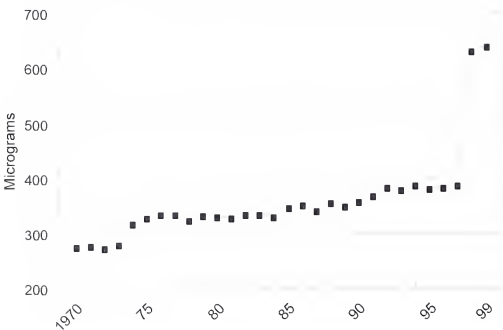
Percentage increase in carbohydrate, protein, and total fat in U.S. food supply (per person per day) from 1970 to 1999



Folate in food supply increased sharply after 1998

Folate reduces the risk of some serious birth defects when consumed before and during pregnancy. Mandated folate fortification of flours and cereals in 1998 increased the folate level in the U.S. food supply. In 1999 the level of folate was 641 micrograms per person per day, an increase of more than 130 percent from the 1970 level of 278 micrograms per person per day.

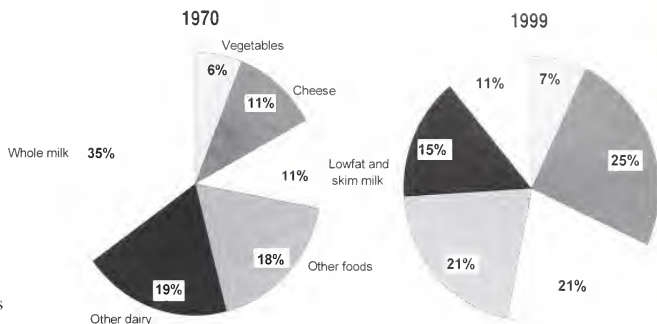
Folate in U.S. food supply (per person per day) over time



More calcium coming from lowfat and skim milk and less from whole milk

Calcium levels have generally increased in the food supply, from 930 milligrams in 1970 to 990 milligrams per person per day in 1999. Lowfat and skim milk provided 11 percent of calcium in the food supply in 1970 and 21 percent in 1999. On the other hand, whole milk provided 35 percent of calcium in the food supply in 1970 and 11 percent in 1999. This shift supports dietary guidance that recommends diets low in saturated fats.

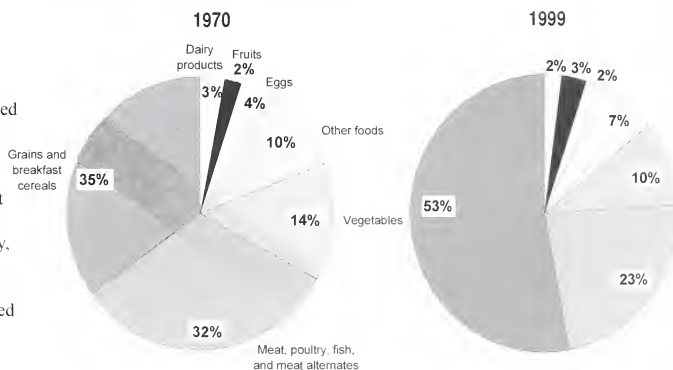
Sources of calcium in the U.S. food supply



More iron coming from grains and breakfast cereals and less from meat, poultry, fish, and meat alternates

Iron levels in the food supply increased from 15.3 milligrams per person per day in 1970 to 23.6 milligrams per person per day in 1999. Grains and breakfast cereals provided 35 percent of iron in the food supply in 1970 and 53 percent in 1999. Meat, poultry, fish, and meat alternates provided 32 percent of iron in the food supply in 1970 and 23 percent in 1999. Enriched grains and fortified ready-to-eat breakfast cereals contributed to the increase in grains and cereals as a source of iron.

Sources of iron in the U.S. food supply



Source: Gerrior, S. & Bente, L. (2001). *Food supply nutrients and dietary guidance, 1970-99*. FoodReview, 24(3), 39-46.

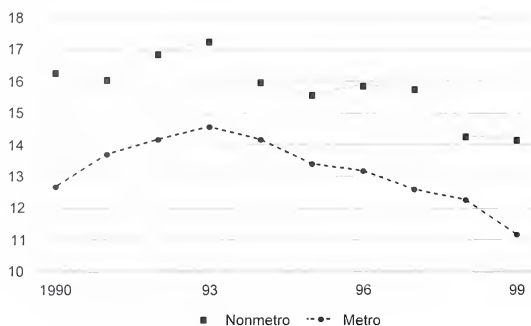
Rural Poverty

About 7.4 million people who live in rural (nonmetro) areas were poor in 1999. Based on data from the U.S. Census Bureau's Current Population Survey (March Supplement), the rate of rural poverty for 1999 was 14.2 percent. Rural poverty rates were not under 15 percent for 2 consecutive years at any other time in the 1980's or 1990's. The rural poverty rate for 1999 was the lowest it has been since 1979; similarly, the national and urban poverty rates in 1999 were also at their lowest levels since 1979. These relatively low levels of poverty coincided with the economic boom in the United States.

Rural and urban poverty rates declined in the 1990's

Poverty rates declined in both rural and urban areas in the 1990's, with rural rates higher than urban rates. From 1998 to 1999, the urban poverty rate declined at a greater pace (from 12.3 to 11.2 percent) than did the rural poverty rate (from 14.3 to 14.2 percent). This widened the gap in rural-urban poverty, from the average 2.6 percentage points of the 1990's to 3 percentage points between 1998 and 1999.

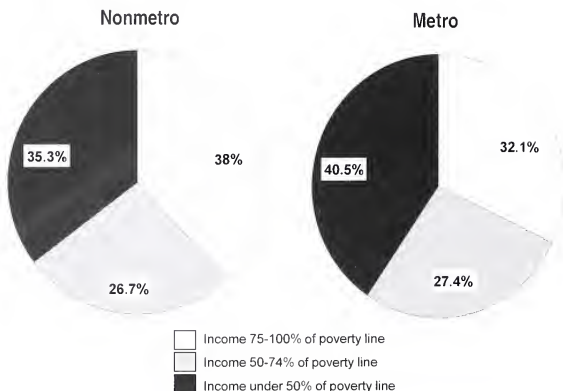
Poverty rates by residence over the 1990's



Lower percentage of the extremely poor live in rural areas

Of the poor in 1999, 35.3 percent of the rural poor were extremely poor versus 40.5 percent of the urban poor. Extreme poverty is defined as having an income less than half the poverty line. Similarly, 38 percent of the rural poor versus 32.1 percent of the urban poor had incomes between 75 and 100 percent of the poverty line.

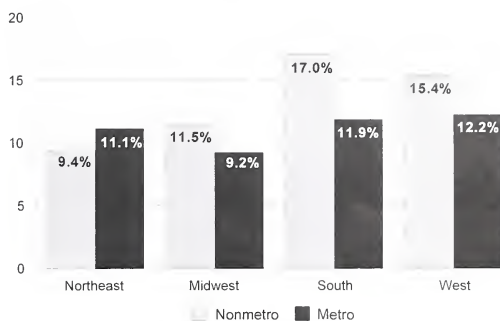
Distribution of the poor by residence, 1999



Rural poverty rates highest in South

Poverty rates differed by U.S. region. In 1999 the South had the highest rate of rural poverty (17 percent) and the Northeast the lowest (9.4 percent). The West had the highest rate of urban poverty (12.2 percent); the Midwest, the lowest (9.2 percent).

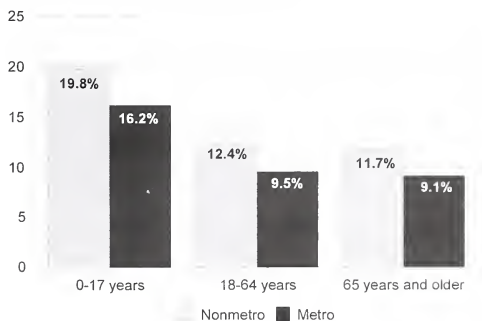
Poverty rates by region and residence, 1999



Rural poverty rates highest for children

The 1999 rural poverty rate for children was 19.8 percent, resulting in 2.7 million children being affected. This poverty rate was 7.4 percentage points greater than the rate for adults and 8.1 percentage points greater than the rate for elderly persons living in rural areas. For all age categories, rural poverty rates were higher than urban rates in 1999.

Poverty rates by age and residence, 1999



Source: Joliffe, D. (2002). Rural poverty rate stayed under 15 percent in 1999. *Rural America*, 16(4), 39-41.

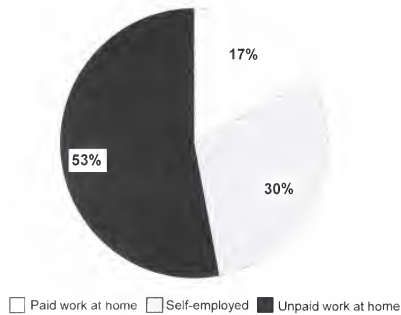
Work at Home in 2001

In May 2001, 19.8 million people age 16 and over—accounting for 15 percent of total employment—usually performed some work at home as part of their primary job. People who usually work at home are defined as those who work at home at least once per week as part of their primary job. These findings are from a special supplement to the May 2001 Current Population Survey, a survey of about 50,000 households conducted by the U.S. Census Bureau for the Bureau of Labor Statistics. Respondents to the supplement answered questions about work schedules, job-related work at home, and related topics.

Half of those who worked at home were not directly compensated

Slightly more than half of those who usually worked at home were wage and salary workers who took work home from the job and worked on an unpaid basis. Another 17 percent had a formal arrangement with their employer to be paid for their at-home work. The remainder who worked at home were self-employed.

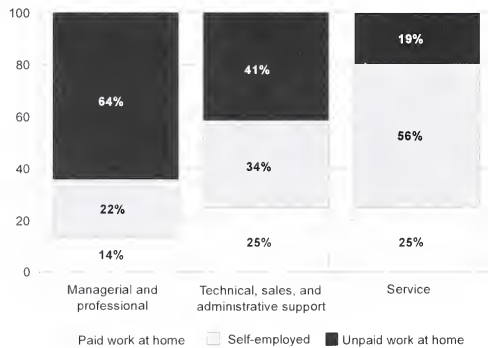
Pay status of people doing job-related work at home, 2001



More managers and professionals worked at home on an unpaid basis

Of people in managerial and professional occupations usually doing job-related work at home, most (64 percent) were unpaid. This contrasted with the 41 percent of people in technical, sales, and administrative support and the 19 percent of people in service occupations usually doing unpaid job-related work at home.

Pay status of people in selected occupations doing job-related work at home, 2001

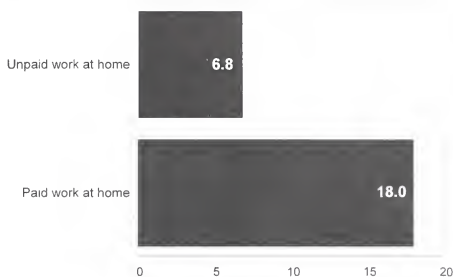


People who worked at home on a paid basis worked more hours

The average time worked at home for people expressly paid for this work was 18 hours; 1 in 6 of these people put in 35 hours or more at home.

The average time worked at home for people without a formal arrangement to be paid for this work was 6.8 hours; 23 percent worked 8 or more hours at home.

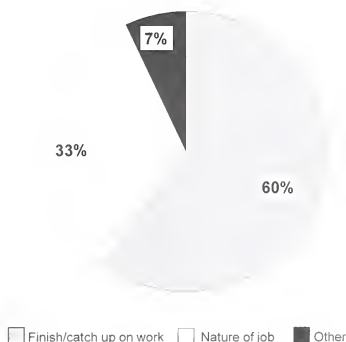
Average hours usually worked at home



Most people doing unpaid work at home were trying to finish or catch up on work

When asked the reason for their working at home without pay, 60 percent of those who usually work at home stated they did so to finish or catch up on work; 33 percent said they did so because of the nature of the job; the remainder gave other reasons (e.g., coordinate work schedule with personal or family needs, reduce commuting time, or reduce expenses).

Reasons for working at home when not paid



Source: Bureau of Labor Statistics. *Work at home in 2001*. Retrieved at: <http://www.bls.gov/cps>, March 27, 2002.

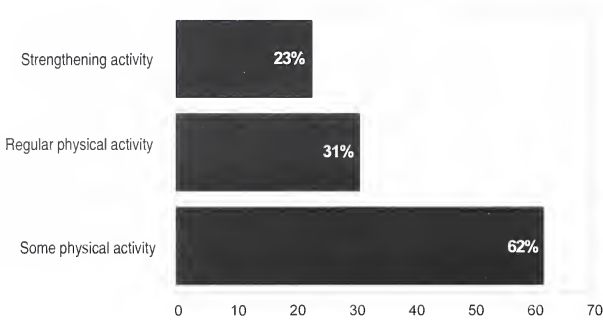
Leisure-Time Physical Activity Among Adults, 1997-98

This report, based on data from the 1997-98 National Health Interview Survey (NHIS), presents selected prevalence estimates for leisure-time physical activity among U.S. adults. Computer-assisted personal interviews were used to collect data from the U.S. civilian noninstitutionalized population. A total of 68,556 interviews was completed by a sample of adults aged 18 years and over, resulting in an overall response rate of 77.2 percent. NHIS questions on leisure-time physical activity, first asked in 1997, consisted of frequency and duration of light-moderate activity, frequency and duration of vigorous activity, and frequency of strengthening activity. Statistics were age-adjusted to the 2000 projected U.S. population. Adults classified as engaging in at least some activity were those who engaged in any light-moderate or vigorous leisure-time physical activity for at least 10 minutes, regardless of frequency.

Six in ten adults engaged in some physical activity

Sixty-two percent of adults engaged in some leisure-time physical activity during the year. Thirty-one percent engaged in regular physical activity (light-moderate activity 5 times or more per week for 30 minutes or more each time or vigorous activity 3 times or more per week for 20 minutes or more each time). Twenty-three percent engaged in strengthening activities (e.g., lifting weights or calisthenics) designed to strengthen muscles.

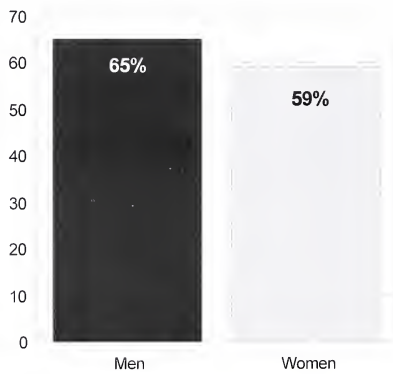
Adults engaged in physical activity



Men more likely to engage in some physical activity

Men were more likely than women to engage in some leisure-time physical activity (65 vs. 59 percent). Men also were slightly more likely than women to engage in light-moderate or vigorous activity or both at least 5 times per week, as well as strengthening activities.

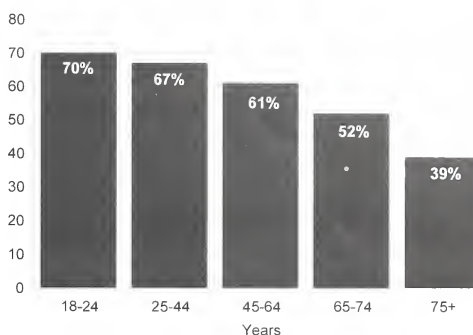
Men and women engaged in some physical activity



Physical activity decreased with age

Adults 18-24 years old were almost twice as likely as adults 75 years and over to engage in some physical activity (70 vs. 39 percent). Adults in the younger age groups also were more likely than those in the older age groups to engage in light-moderate, vigorous, and strengthening physical activity.

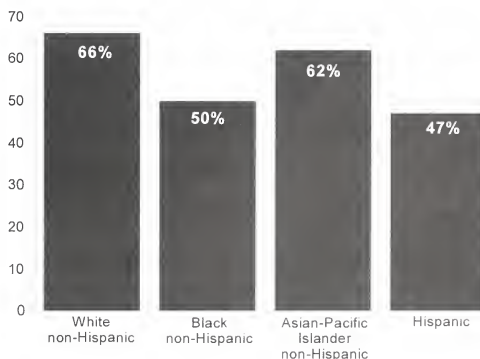
Adults engaged in some physical activity, by age



Whites more likely to engage in physical activity

White non-Hispanic adults (66 percent) and Asian/Pacific Islander non-Hispanic adults (62 percent) were more likely than Black non-Hispanic adults (50 percent) and Hispanic adults (47 percent) to engage in some leisure-time physical activity. Engaging in light-moderate physical activity at least 5 times per week, as well as vigorous physical activity, at least 5 times per week was more prevalent among White non-Hispanic adults than among other race-ethnic groups.

Adults engaged in some physical activity, by race-ethnicity



Source: Schoenborn, C.A. & Barnes, P.M. (2002). *Leisure-time physical activity among adults: United States, 1997-98. Advance Data from Vital and Health Statistics. National Center for Health Statistics, Centers for Disease Control and Prevention, Department of Health and Human Services. No. 325.*

Journal Abstracts

The following abstracts are reprinted verbatim as they appear in the cited source.

Brewer, M.S. & Prestat, C.J. (2002). Consumer attitudes toward food safety issues. *Journal of Food Safety*, 22(2), 67-83.

The objectives of this study were to survey consumer attitudes about the safety of the food supply in general, relate general concern levels with groups of specific items of concern, regulatory issues and prioritization of food safety funding areas, and to compare these results with results of a similar survey conducted in this lab in 1994. Factor analysis of 360 consumer responses showed six factors underlying the 31 specific items evaluated on individual 5-point scales (1 = non concern, 5 = very strong concern). MANOVA using general level of food safety concern (independent variable) were significant. Univariate tests showed that as general level of concern with food safety increased, so did concern with chemical issues (artificial colors, pesticide residues, hormones, preservatives, irradiated foods, excessive processing of foods, and plastic packaging), spoilage issues (restaurant sanitation, shelf-stable foods, pasteurized foods, refrigerated, prepared foods, improper food preparation, microbiological contamination and nutritional imbalances), health issues (vitamin, calorie, carbohydrate, fat, cholesterol and sugar content), regulatory issues (pesticide safety, fish and imported food inspection, and health labeling of food), deceptive practices (naturally occurring toxins, food ingredients associated with allergies and weight reduction diets advertised as healthy) and information issues (availability of detailed information at stores, markets and restaurants).

Cha, K.-W. & Weagley, R.O. (2002). Higher education borrowing. *Financial Counseling and Planning*, 13(1), 61-73.

Using the 1992-93 Baccalaureate and Beyond Longitudinal Study and 1997 follow-up, this study examined which factors influence the decision to borrow and the amount of borrowing for higher education. A double-hurdle model was applied to analyze both the decision to borrow and the borrowed amount equations. Current income and asset holdings had generally negative impacts on higher education debt, while expected future income increased amounts borrowed. Total costs had a positive effect on the probability and the level of borrowing. Total grants received had a negative influence on amount borrowed, but a positive influence on the participation decision.

Cook, C.C., Crull, S.R., Fletcher, C.N., Hinnant-Bernard, T., & Peterson, J. (2002). Meeting family housing needs: Experiences of rural women in the midst of welfare reform. *Journal of Family and Economic Issues*, 23(3), 285-316.

Though sometimes overlooked, the availability, affordability, and quality of housing in rural communities are a potential barrier to transitioning from welfare to work. In this investigation we examine housing issues confronting 17 rural women and their families who were recipients of welfare benefits in 1997. Respondents' housing accounts illustrate the significance of reliance on both government housing subsidies and informal subsidies supplied by friends,

family, and more distant relatives. The study focuses on concerns women have in meeting their families shelter needs and the complexities involved in doing so. The findings of the research suggest that additional housing policy initiatives, as well as a targeted research agenda are needed, especially for families whose welfare benefits are nearing termination.

Lauderdale, D.S. & Kestenbaum, B. (2002). Mortality rates of elderly Asian American populations based on Medicare and Social Security data. *Demography*, 39(3), 529-540.

We present sex- and age-specific death probabilities for the elderly of six Asian American subgroups—Chinese, Filipino, Indian, Japanese, Korean, and Vietnamese—based on data from Social Security Administration files. We determined ethnicity by combining race, place of birth, surname, and given name. The data source and ethnic determination are the same for deaths and the population at risk, avoiding the problem of noncomparability present when data for the numerator come from vital records and data for the denominator come from census records. We found that death rates for elderly Asian Americans are lower than those for whites, and that socioeconomic differences between subgroups do not translate into like differences in mortality.

Lee, J. (2002). The poor in the financial market: Changes in the use of financial products, institutions, and services from 1995 to 1998. *Journal of Consumer Policy*, 25(2), 203-231.

The poor are in a disadvantaged position in the financial market. In this article, a review is given of public policy initiatives that are implemented to help the poor as well as an examination of how the poor are served in the financial market, using data from the 1995 and 1998 Survey of Consumer Finances provided by the Federal Reserve Board. Specifically, poor households' use of depository and credit products, the financial institutions that provide these products to the poor, and the way in which the poor conduct their financial business (e.g., visit to branch offices, ATMs, etc.) are compared to that of non-poor households. Marketing and public policy implications are drawn from the findings.

Miyazaki, A.D. & Krishnamurthy, S. (2002). Internet seals of approval: Effects on online privacy policies and consumer perceptions. *The Journal of Consumer Affairs*, 36(1), 28-49.

The use of Internet seal of approval programs has been touted as an alternative to potential legislation concerning consumer-related online privacy practices. Questions have been raised, however, regarding the effectiveness of such programs with respect to maintaining privacy standards and aiding online consumers. The authors examine these issues in a series of three studies, the first of which is an exploratory application of Federal Trade Commission privacy standards to various online privacy policies in an effort to determine the ability of seal of approval program participation to act as a valid cue to a firm's stated privacy practices. The second and third studies are experiments designed to ascertain how online firm participation in Internet seal of approval programs affects consumers. Implications for consumer policy are discussed.

Paeratakul, S., York-Crowe, E.E., Williamson, D.A., Ryan, D.H., & Bray, G.A. (2002). Americans on diet: Results from the 1994-1996 Continuing Survey of Food Intakes by Individuals. *Journal of the American Dietetic Association*, 102(9), 1247-1251.

Objective. To examine the prevalence of dieting to lose weight or for a health reason in a representative sample of US adults.

Design. Cross-sectional study design.

Subjects/Setting. Data from 10,144 participants of the 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII 1994-1996) were used in the analyses. All data were self-reported.

Statistical analysis. Analysis included: cross-tabulation of dieting status by sociodemographic characteristics; comparison of the type of diet, the reason for dieting, and the source of diet used by men and women; comparison of the nutrient intake and health status of dieters and nondieters.

Results. Prevalence of dieting varied by gender and race, being highest in white women (21%) and lowest in Hispanic men (8%). About 71% of all dieters reported that they were dieting to improve health, and 50% reported that they were dieting to lose weight. Dieters reported lower intakes of total fat, saturated fat, cholesterol, sodium, monounsaturated fat, polyunsaturated fat, calcium, and selenium compared with nondieters. The rate of chronic health conditions was higher among dieters than nondieters. Self-reported physical activity was similar in both groups.

Conclusions. The prevalence of dieting varies according to sociodemographic characteristics. The reason for dieting and the type of diet used by dieters also vary and need to be studied further. Our results suggest that the dieters generally consumed a more nutrient-dense diet than the nondieters but still low in certain nutrients.

Nord, M., Andrews, M., & Winicki, J. (2002). Frequency and duration of food insecurity and hunger in US households. *Journal of Nutrition Education*, 34(4), 194-201.

Objective: This study examines the extent to which food insecurity and hunger in US households are occasional, recurring, or frequent/chronic.

Design/Variables: The federal food security scale measures the severity of food insecurity in surveyed households and classifies households as to their food security status during the previous year. The Current Population Survey Food Security Supplement (CPS-FSS) collects the data elements used to calculate the food security scale.

Supplementary data on the frequency of occurrence of the behaviors and experiences comprising the food security scale are also collected by the CPS-FSS, but most of this information is not included in the food security scale. This study analyzes these supplementary data along with the food security scale and its constituent items using data from the Food Security Supplement of the nationally representative CPS conducted in August 1998.

Results: About two thirds of households classified as food insecure by the federal food security scale experience the condition as recurring, and around one fifth experience these conditions as frequent or chronic. The monthly prevalence of hunger is about 60% of the annual prevalence, and the daily prevalence is about 13% to 18% of the annual prevalence.

Conclusions and Implications:

Nutritionists can use these findings to enhance the informative value of food insecurity and hunger statistics from national, state, and local surveys when interpreting them to policy makers and to the general public.

Official USDA Food Plans: Cost of Food at Home at Four Levels, U.S. Average, December 2002 ¹

AGE-GENDER GROUPS	WEEKLY COST				MONTHLY COST			
	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan
INDIVIDUALS²								
CHILD:								
1 year	\$16.60	\$20.50	\$24.10	\$29.30	\$71.90	\$88.80	\$104.40	\$127.00
2 years	16.60	20.50	24.10	29.30	71.90	88.80	104.40	127.00
3-5 years	18.10	22.50	27.90	33.40	78.40	97.50	120.90	144.70
6-8 years	22.60	30.00	37.30	43.40	97.90	130.00	161.60	188.10
9-11 years	26.50	34.00	43.40	50.30	114.80	147.30	188.10	217.90
MALE:								
12-14 years	27.50	38.40	47.50	55.90	119.20	166.40	205.80	242.20
15-19 years	28.50	39.60	49.30	56.90	123.50	171.60	213.60	246.50
20-50 years	30.50	39.50	49.10	59.50	132.20	171.20	212.80	257.80
51 years and over	27.70	37.60	46.20	55.50	120.00	162.90	200.20	240.50
FEMALE:								
12-19 years	27.50	33.10	40.10	48.40	119.20	143.40	173.80	209.70
20-50 years	27.50	34.50	42.00	53.90	119.20	149.50	182.00	233.50
51 years and over	27.10	33.60	41.70	49.70	117.40	145.60	180.70	215.40
FAMILIES:								
FAMILY OF 2³:								
20-50 years	63.80	81.40	100.20	124.70	276.50	352.80	434.30	540.40
51 years and over	60.30	78.30	96.70	115.70	261.10	339.40	419.00	501.50
FAMILY OF 4:								
Couple, 20-50 years and children—								
2 and 3-5 years	92.70	117.00	143.10	176.10	401.70	507.00	620.10	763.00
6-8 and 9-11 years	107.10	138.00	171.80	207.10	464.10	598.00	744.50	897.30

¹Basis is that all meals and snacks are purchased at stores and prepared at home. For specific foods and quantities of foods in the Thrifty Food Plan, see *Thrifty Food Plan, 1999, Executive Summary*, CNPP-7A; for specific foods and quantities of foods in the Low-Cost, Moderate-Cost, and Liberal Plans, see *Family Economics Review*, No. 2 (1983). The Thrifty Food Plan is based on 1989-91 data and the other three food plans are based on 1977-78 data; all four plans are updated to current dollars using the Consumer Price Index for specific food items.

²The costs given are for individuals in 4-person families. For individuals in other size families, the following adjustments are suggested: 1-person—add 20 percent; 2-person—add 10 percent; 3-person—add 5 percent; 5- or 6-person—subtract 5 percent; 7- (or more) person—subtract 10 percent.

³Ten percent added for family size adjustment.

Consumer Prices

Average percent change for major budgetary components

Group	Annual average percent change from December of previous year to December:			Percent change 12 months ending with December 2002
	1990	1995	2000	
All Items	6.1	2.5	3.4	2.4
Food	5.3	2.1	2.8	1.5
Food at home	5.8	2.0	3.0	0.8
Food away from home	4.5	2.2	2.4	2.3
Housing	4.5	3.0	4.3	2.4
Apparel	5.1	0.1	-1.9	-1.8
Transportation	10.4	1.5	4.3	3.8
Medical care	9.6	3.9	4.2	5.0
Recreation	NA	2.8	1.4	1.1
Education and communication	NA	4.0	1.2	2.2
Other goods and services	7.6	4.3	4.5	3.3

Price per pound for selected food items

Food	Price per pound unless otherwise noted (as of December in each year)			December 2002
	1990	1995	2000	
Flour, white, all purpose	\$.24	\$.24	\$.28	\$.29
Rice, white, long grain, uncooked	.49	.55	NA	.46
Spaghetti and macaroni	.85	.88	.88	.93
Bread, white	.70	.84	.99	1.03
Beef, ground, uncooked	1.63	1.40	1.63	1.69
Pork chops, center cut, bone-in	3.32	3.29	3.46	3.32
Chicken, fresh, whole	.86	.94	1.08	1.05
Tuna, light, chunk	2.11	2.00	1.92	2.03
Eggs, grade A, large, per dozen	1.00	1.16	.96	1.18
Milk, fresh, lowfat, per gallon	NA	2.31	2.66	NA
Butter, salted, grade AA, stick	1.92	1.73	2.80	2.84
Apples, red delicious	.77	.83	.82	.99
Bananas	.43	.45	.49	.50
Oranges, navel	.56	.64	.62	.74
Potatoes, white	.32	.38	.35	.48
Lettuce, iceberg	.58	.61	.85	.68
Tomatoes, field grown	.86	1.51	1.57	1.66
Broccoli	NA	.76	1.52	1.05
Carrots, short trimmed and topped	.43	.53	NA	NA
Onions, dry yellow	NA	.41	NA	NA
Orange juice, frozen concentrate per 16 oz.	2.02	1.57	1.88	1.81
Sugar, white, 33-80 oz. pkg.	.40	.39	.40	.41
Margarine, stick	.87	.79	NA	NA
Peanut butter, creamy	2.09	1.78	1.96	1.90
Coffee, 100% ground roast	2.94	3.75	3.21	2.84

NA = Data not available.

Selected items from CPI Detailed Reports, Bureau of Labor Statistics, various issues. Price changes are for all urban consumers. Food prices are U.S. city average.

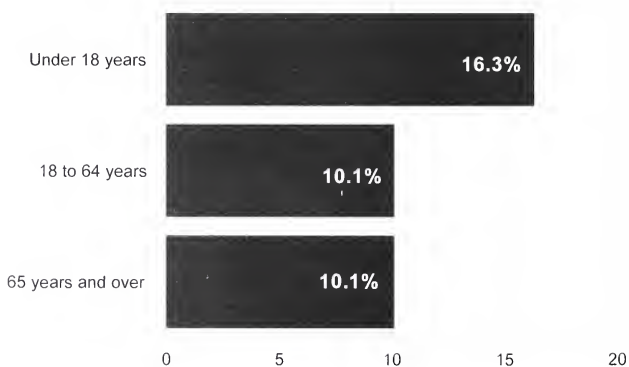
U.S. Poverty Thresholds and Related Statistics

Poverty Thresholds in 2002, by size of family and number of related children under age 18

Size of family unit	Related children under age 18								Eight or more
	None	One	Two	Three	Four	Five	Six	Seven	
One person									
Under age 65	\$9,359								
Age 65 and over	8,628								
Two people									
Householder under age 65	12,047	\$12,400							
Householder age 65 and over	10,874	12,353							
Three people	14,072	14,480	\$14,494						
Four people	18,556	18,859	18,244	\$18,307					
Five people	22,377	22,703	22,007	21,469	\$21,141				
Six people	25,738	25,840	25,307	24,797	24,038	\$23,588			
Seven people	29,615	29,799	29,162	28,718	27,890	26,924	\$25,865		
Eight people	33,121	33,414	32,812	32,285	31,538	30,589	29,601	\$29,350	
Nine people or more	39,843	40,036	39,504	39,057	38,323	37,313	36,399	36,173	\$34,780

Source: U.S. Census Bureau, February 2003.

Poverty rate by age, 2001



Source: U.S. Census Bureau.

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